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OF THE

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Page 26, line 12 —*for* a subsequent, *read* this.

„ 85, „ 2—*dele* on.

„ 232, in note—*for* long. 33°, *read* 32°.

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Royal Geographical Society.

1839.

AT THE

ANNUAL GENERAL MEETING, MAY 27, 1839,

The following Report from the Council was read :—

The Council has again to congratulate the Society upon the steady increase in the number of its Members, affording a gratifying proof, it is willing to believe, of the interest felt by the public in the advancement of geographical science.

Since our last anniversary, sixty-three new Members have been elected; twelve vacancies by death and resignation have occurred; and the Society now consists of 651 Members, besides sixty Foreign Honorary and Corresponding Members.

During the past year we have to lament the loss of a distinguished Foreign Honorary Member, the Baron de Hamelin, an Admiral in the French navy, well known as having been one of the French expedition to the coasts of Australia, about the beginning of this century; and, more lately, as having presided over the Dépôt de la Marine de France, and to whose liberality we are indebted for some of the most costly and valuable works which adorn our library.

Finances.—The state of the finances of the Society, the details of which are annexed, continues satisfactory. The expenditure for the past year has been considerable, in consequence of 225*l.* having been paid towards the South African expedition (now terminated), and 150*l.* towards the expedition to Kurdistán; yet it is gratifying to add, that these heavy demands have been paid out of the current income of the Society, leaving untouched the capital of 4800*l.* invested in the funds—that stock representing the

amount of the compositions of 275 compounding members now living.

Publications.—The Geographical Journal for 1838 consists of three Parts—the first published in February, the second in May, and the third in November; of Vol. IX., the first Part has also been published, and the second Part is now laid upon the table.

It is gratifying to add that not less than 70 papers on subjects connected with geography have been contributed to the Society since our last anniversary.

The first edition of Part II. Vol. III. of the Journal having been exhausted, while the demand for it still continues both by the public at large, and by new Members desirous of obtaining complete sets of the Transactions, the Council has ordered it to be reprinted; and directed that in future the first edition of the Journal be augmented from 1250 to 1500 copies, in order to meet the increased demand on the part of the public.

Her Majesty's Donation.—Her Majesty having been graciously pleased to continue to the Society (as announced at the late anniversary) the annual donation of fifty guineas, as originally granted by her Majesty's royal predecessor for the promotion of geographical science and discovery, the Council have resolved that this sum should be converted into two gold medals of exactly equal value, to be designated the Founder's Medal and the Patron's Medal, respectively.

Acting upon this resolution, the Council has awarded the Founder's Medal for the year 1838 to Mr. George Simpson, of the Hudson's Bay Company's service, who, in conjunction with, and under the immediate orders of, Mr. P. W. Dease, traced the hitherto unexplored coast to the west between Return Reef and Point Barrow, in 1837; and during the past year has discovered 90 miles of coast eastward from Point Turnagain of Franklin, on the northern shore of America.

In making this award, the Council cannot refrain from expressing their admiration of the spirited and liberal conduct of Governor Pelly, and the Committee of the Hudson's Bay Company —so honourable to British commercial enterprise—under whose orders this service has been executed.

The Council has in like manner awarded the Patron's Medal to Dr. Edward Rüppell, of Frankfort, in testimony of the services he has rendered to geography by his travels and researches in Nubia, Kordofán, Arabia, and Abyssinia.

Original Expeditions.—Of the expeditions more immediately under the control of the Society, that of Mr. Schomburgk, into British Guayana, has now nearly completed its fourth year, and the detailed report of his ascent of the rivers Essequibo, Berbice, and Corentyn, has appeared in Vols. VI. and VII. of this Journal; during the two last seasons, which he has spent in the interior of the country, he has explored the source of the Essequibo, crossed the equator, and penetrated into 0° 12′ S. lat.; returning thence to Pirará, he crossed the Brazilian frontier to Fort San Joaquim descended about 30 miles of the Rio Branco, and explored the Carumá mountains on its eastern bank. Returning again to Pirará, Mr. Schomburgk has travelled in a N.W. direction to the sources of the river Caruni, and to the mountains of Rorima, and at the date of his last letter, 20th Nov. 1838, was about to proceed to the westward to the head-waters of the Orinoco, with the intention of descending that river to Esmeralda, thence to cross over to the Padaviri, a tributary of the Amazons, and thus work his way back again to Demerara. Both Mr. Schomburgk and his party had suffered much from fever and climate, but his zeal in the cause of discovery appears unabated.

The objects of the expedition to Kurdistán, undertaken in conjunction with the Society for the promotion of Christian Knowledge, were announced last year, and the instructions given to the travellers are appended to this Report. Quitting England in June last, Mr. Ainsworth made a series of observations for magnetic dip and intensity, in his way across the continent of Europe to Constantinople; there, joining Mr. Rasám, the party left that city on 20th September, and, taking the road by Izmíd, Erekli, Bói-ábád, and ascending the course of the Halys, reached Angora in the beginning of December, 1838. A detailed report of this journey is printed in the volume now laid on the table.

Foreign and Colonial Correspondence.—Five Foreign Corresponding Members have been added to the list since our last anni-

versary—namely, Colonel Skribaneck, Director of the Dépôt Topographique at Vienna; Colonel Oberreit, Chief of that at Dresden; Professor C. C. Rafn, Secretary to the Society of Northern Antiquaries at Copenhagen; Dr. Von Schlieben, head of the Statistical Society of Saxony; and Don Eduardo Carrasco, Hydrographer in Peru—and the Council have great pleasure in noticing the gradual increase of the Foreign and Colonial Correspondence of the Society.

Library.—A list of accessions made to the library, consisting of upwards of 400 volumes and 500 maps and charts, is printed with this Report. For many of these works the Society is indebted to the liberality of Foreign Academies; but more especially to the Dépôts de la Guerre et de la Marine in France; to the Academies of St. Petersburg, Berlin, Copenhagen, Lisbon, and Paris; and to the Dépôts Topographiques of Austria and Wurtemburg, for several valuable donations.

The insufficiency of the apartments at present occupied by the Society is a great and increasing evil. The endeavours which the House Committee have made during the last year to remedy this evil have been unremitting, and the Council regret to add, hitherto unsuccessful.

BALANCE-SHEET FOR 1838.

Dr.

	£.	s.	d.
Balance in hand, January 1st, 1838	30	18	11
Entrance of 65 Members at 3*l.*	195	0	0
Composition of 27 Members at 17*l.*	459	0	0
Subscription of 257 Members at 2*l.*	514	2	0
Arrears paid up	50	0	0
Dividends on Stock (4800*l.* reduced 3½)	168	0	0
Royal Premium	52	10	0
Journals sold in 1838	128	17	6
Christian Knowledge Society for Kurdistán Expedition	500	0	0
	£2,098	8	5

Cr.

	£.	s.	d.
House rent	110	0	0
Salaries	300	0	0
Printing Journal, Vol. VII.	285	0	0
Reprinting Journal, Vol. III. Part I.	24	0	0
Illustrations for Vol. VII.	170	14	6
———— for Reprint of Vol. III.	16	7	6
Kurdistán Expedition	298	0	0
South African ditto	223	0	0
Guayana Expedition	5	5	0
Royal Premium	52	10	0
Books and Maps	64	5	8
Collector	21	0	0
Alteration in Die of Medal	10	0	0
Stationery	11	15	4
Firing and Lights	10	6	3
Porterage, Carriage of Parcels, &c.	15	18	0
Attendance and Wages of Housekeeper	17	17	0
Postage of Letters	18	1	0
Expenses of Evening Meetings	16	13	6
Insurance, Advertisements	4	10	0
Furniture and Repairs	1	6	0
Subscriptions returned	6	0	0
	1,682	9	9
Balance in hand, Dec. 31st, 1838	415	18	8
	£2,098	8	5

(Signed) JOHN BIDDULPH, Treasurer.

The above Accounts have been compared by us with the corresponding vouchers, and found to be correct.—10th May, 1839.

(Signed) { JAMES MEEK.
FRANCIS BECKFORD.

ESTIMATE FOR 1839.

Dr.

		£.	s.	d.
Balance in hand (1st January, 1839)		415	18	8
Probable Amount of Subscriptions, viz.				
Entrance of 60 Members	£180			
Composition of 25 ditto	425			
Subscription of 250 ditto	500			
		1,105	0	0
Arrears likely to be recovered		100	0	0
Dividends on Stock		168	0	0
Sale of Journal		140	0	0
Royal Premium		52	10	0
		£1,981	8	8

Cr.

	£.	s.	d.
House rent	110	0	0
Salaries	300	0	0
Printing Journal Vol. VIII.	320	0	0
Illustrations for Journal	150	0	0
Reprinting Journal, Vol. III., Part II.	42	0	0
Illustrations for Reprint	20	0	0
Kurdistán Expedition	500	0	0
Guayana Expedition	100	0	0
White Nile Expedition	50	0	0
Books and Maps	100	0	0
Office Expenses, including Firing, Lights, Refreshments at Meetings, Attendance, Postage, &c.	100	0	0
Royal Premium	52	10	0
Sinking Die of Patron's Medal	52	10	0
Collector	21	0	0
	£1,918	0	0

(Signed) JOHN WASHINGTON,
Secretary.

At the Anniversary Meeting held on the 27th May, 1839, the President presented the gold medals, awarded respectively to Dr. RÜPPELL, of Frankfort, and Mr. THOMAS SIMPSON, of the Hudson's Bay Company, in the following words:—

"Chevalier BUNSEN,—It is peculiarly gratifying to me that, as President of the Royal Geographical Society, it has fallen to my lot to place a gold medal, the gift of our most gracious Sovereign, and awarded by the Council of this Society to my much valued friend Dr. Edward Rüppell, of Frankfort, in the hands of another highly valued friend, the Chevalier Bunsen, for the purpose of its being transmitted to its deserving owner. This medal is awarded to Dr. Rüppell in testimony of the high sense which the Council feel of the services rendered by him for the advancement of Physical Geography: and though Dr. Rüppell, together with his habits of minute accuracy, his innate love of truth, and the truly philanthropic spirit which he carried with him to Arabia Petræa, and to the burning sands of Abyssinia, and Kordofan; although Dr. Rüppell, besides his assiduity and exactness in using his mathematical instruments for astronomically fixing the sites of every important place he visited, was also a distinguished and indefatigable naturalist, we love to regard him chiefly as a geographer; and as such to proclaim, as we do, our high sense of his merits as a large benefactor to the science we profess to cultivate. Dr. Rüppell made three journies into Africa: his first was of short duration, for he soon left Egypt to return to Europe, where alone he could hope to attain sufficient proficiency as a practical astronomer, to travel with advantage through unknown regions. He placed himself under the tuition of the lamented Baron von Zach; he returned to Egypt, and visited Arabia, the gulf of 'Akabah (which he was the first to explore geographically), Abyssinia, and Kordofan. All the produce of his travels in the department of zoology, which absorbed a large half of the pecuniary means at his disposal, Dr. Rüppell nobly and generously made over on his return home to his native city. The same has been the result, and the same the sacrifice, of his second journey into the same countries: and the city of Frankfort is mainly indebted to the disinterested conduct of one of the most illustrious of her citizens, for the high rank she holds, even in Germany, in the possession of a splendid museum of natural history, and a learned director at the head of it. The most valuable portion of Dr. Rüppell's geographical discoveries and *data* are to be found in the pages of his own luminous and learned narratives (the latter part of which is now in the course of publication), or in those of the *Correspondance Astronomique*, edited at Genoa by his friend, Baron von Zach; and they will long continue to be the chief guides of those who may undertake hereafter to follow Dr. Rüppell's steps in the honourable route which he has laid open.

"Chevalier Bunsen,—The Royal Geographical Society of London are highly gratified with the opportunity thus afforded them of presenting, through the channel of one, to whom all branches of literature are so highly indebted, the royal medal, awarded by the Council to Dr. Rüppell, your distinguished countryman."

To which Mr. Bunsen replied:—

"Sir,—In receiving the medal your Society has awarded to Doctor Eduard Rüppell, I beg to express the thanks of that learned countryman of mine, to whom I shall be happy to forward this honourable token of your high esteem. In expressing these thanks, and at the same time the warm interest I personally take in the distinctions decreed by you to my countryman I know I speak, also, the feeling of the illustrious city to which he and his collections belong, and those of our common country, Germany, which is proud of the successful efforts of one of her most meritorious sons, and will equally be so of the honour England has at this moment bestowed upon him, through this Society. And, indeed, this encouraging proof your nterest and of your admiration is well adapted to recall to the mind recollections of a particularly pleasing nature to both countries. For when I look back to the distinguished travellers and discoverers whom my native country has produced in this and in the last century, I see before me an imposing series of illustrious names, connected with this country by the ties of hospitality and friendship, and powerfully assisted in their noble endeavours by the generous zeal of your learned and patriotic societies. Allow me only to mention Forster, the natural philosopher and distinguished writer, who accompanied Captain Cook on his great voyage of discovery: and of later times, Hornemann and Burckhardt, who received in this country the means of executing their bold plans, to penetrate into unknown parts of Arabia and of Africa. It has not been forgotten, Sir, in my country, and will never be forgotten, that England followed with anxious interest the course of those intrepid travellers, and that it mourned over the cruel fate that put an end to their enterprize, as if they had been her own native children. Let me only add, that he, who, for his admirable simplicity and the clearness of his observations, may be called the modern Herodotus, and who, with Pococke, Alexander von Humboldt, and a few others, ranks among the most accomplished travellers of all ages—that Niebuhr, the elder, I say, found among the English in India and in this country, the most effectual assistance, and the most encouraging interest, as he himself has recorded, and as his great son has so thankfully acknowledged in the biography of his father.

"As to your Society, Sir, in particular, it has by its very statutes acknowledged, and by its actions invariably sanctioned, the great and elevating truth, that science and virtue have their home and their sanctuary in every country, where these pillars of humanity are duly appreciated. I name both together, because they ought to be inseparable, and I am particularly happy to find that, in this very instance, you have equally honoured both: for as you yourself have so feelingly remarked in your discourse, the distinction awarded to Dr. Rüppell has been equally given to the intellectual merit and efforts of the traveller, and to the noble disinterestedness and the generous patriotism of the good citizen, who, after having sacrificed his fortune for the advantage of science, offered the gift of his rich and valuable collections to his native town. It is unnecessary to enlarge further on this subject; but it will be gratifying to you to know, that the generosity of Dr. Rüppell has not been bestowed upon a barren ground. That city, which may well be held up

as a model for other rich and commercial towns, on account of the noble institutions she has raised for science and literature,—mostly monuments of the patriotism of her children,—is uniting those collections in a magnificent museum, worthy of its contents, of its founders, and of the free town that produced Goethe.

"As to myself, I can only say in answer to the extremely partial mention you have made of my name, that, deeply feeling how little I have done to merit such partiality, I trust I shall never be found deficient in gratitude for the kindness which has inspired it."

The President then addressing the Deputy Governor of the Hudson's Bay Company, said:—

"MR. HARRISON,—In the absence of Mr. Thomas Simpson, to whom the Council of the Royal Geographical Society of London have awarded their medal in testimony of the deep gratification which they feel in the success which has attended the enterprise and exertions of Mr. Simpson on the north coast of North America, and in the absence of Mr. Pelly, Governor of the Hudson's Bay Company, I am happy that you have been selected by that gentleman to accept the friendly office of receiving this medal in the name of Mr. Simpson. The services which Mr. Simpson, and his friend and senior officer, Mr. Dease, have rendered to Geography, in advancing, almost to its completion, the solution of the great problem of the configuration of the northern line of the North American continent, are, in the opinion of the Council of this Society, eminently meritorious; and Mr. Simpson and Mr. Dease, whatever may be the result of their further labours, have already earned for themselves a high place amongst those who have added to the fame and glory of British enterprise. In the summer of 1837, Messrs. Dease and Simpson, under directions from the Hudson's Bay Company, starting from the Great Slave Lake, followed the steps of Franklin as far as the point called Franklin's Farthest, whence they traced the remainder of the coast to the westward to Point Barrow; by which they completed our knowledge of this coast the whole way west of the Coppermine River, as far as Behring's Straits. During the following summer, the same adventurous officers, encouraged by the generous spirit of their employers in their attempts to brave the obstacles which a hard and rugged nature was interposing in the way of our knowledge of that part of the American continent, and anxious that this palm of victory should also, with so many others, encircle the brow of Britannia, again started from their winter quarters, as early as the season would permit, and, descending the Coppermine River, they again followed Sir John Franklin's route to Cape Turnagain—his eastern extreme—in longitude 109° nearly; from which point Mr. Simpson proceeded to the eastward about ninety miles. From the spot he had then attained, and which has since received the appropriate name of "Simpson's Farthest," he could descry a further line of coast about thirty miles in extent; and he had the gratification of thence discovering a fine open sea to the north and east: his supply of provisions here obliged him to retrace his steps. The result of these two expeditions is, that the northern

shores of America,—all the acquisition of British hardihood, perseverance, and judgment,—can now be accurately laid down on our maps, from Behring's Straits to the 106th degree of longitude, forming a continuous line of coast of upwards of sixty degrees; and a fair prospect is opened, that another season may go far to complete our knowledge of the whole.

"Sir,—I beg to place this medal in your hands, to be given to Mr. Simpson by Mr. Pelly, the Governor of your prosperous and high-spirited association; and I beg that Mr. Simpson may be assured that this Society warmly participate in the honourable reward which Messrs. Dease and Simpson may expect in the gratitude of their country, and that we shall be happy to give them a welcome reception within these walls on their return to England."

To which the Deputy Governor replied:—

"Sir,—Highly gratifying as it must be to me personally, to receive, on the part of Mr. Simpson, this mark of the approbation of the Royal Geographical Society of London, I cannot but regret that, owing to an unavoidable engagement, Mr. Pelly, the Governor of the Hudson's Bay Company, is prevented from being present; as I am sure he would have been peculiarly gratified, on this occasion, having taken so large a share in conjunction with Mr. George Simpson, in planning the operations and directing the arrangements that have led to this successful result on the arctic shores of America. Mr. P. W. Dease and Mr. Thomas Simpson, the two officers of the Hudson's Bay Company who have been employed on this expedition, were selected by the Governor and Committee, as combining the vigour, zeal, and ardour of youth with the experience, judgment, and discretion of riper years, and the result has justified the choice. The time of conferring on these gentlemen the distinction of a Royal Premium seems particularly happy, as it is at a moment when the parties themselves might apprehend, from not having done all they hoped to do last summer, that their work would be considered incomplete. But the award of this evening will prove to them that the medals of this Society are bestowed not only for works already performed, but as an encouragement for future exertion in the cause of discovery. It is a great satisfaction that the Hudson's Bay Company, as a commercial Company, have been able to extend their discoveries not only *within*, but *beyond* Her Majesty's dominions; and that you, Sir, on the part of the Geographical Society, should have expressed your approbation that they have not limited or restricted their endeavours, in time or expense, whenever they could aid the great cause of the advancement of geographical science and discovery."

Instructions of the Council of the Royal Geographical Society of London addressed to the Leaders of the Expedition for Exploring in Kurdistán. 1st June, 1838.

Gentlemen,—Having laid before the President and Council of the Royal Geographical Society the paper signed by you jointly, a few days before Mr. Rasám left England, in which you enumerate the various objects to which you understand that your attention is to be directed during the expedition into Kurdistán, I am instructed by the Council to express to you their general approbation of the details contained in that document. But, as a considerable portion of it is occupied with a reference to the special objects contemplated by the Society for Promoting Christian Knowledge, I am now, by the desire of the Council, to call your particular attention to those points of geographical research, of which it is more peculiarly the object of this Society to promote the investigation.

The Council are aware that Mr. Rasám quitted England about the middle of February, and would proceed immediately to Malta, whence he will embark for Constantinople, so as to meet Mr. Ainsworth there about the last week in July.

Mr. Ainsworth will leave England in the month of June to reach Constantinople by a land journey, taking such a route, and visiting such parts of the continent on his way, as he may think expedient with a view to furnishing himself with such additional information and materials for his further proceedings as he may be desirous to obtain; and should he traverse the Turkish provinces, the passages and heights of the Balkán (of which we know very little) will be particularly deserving of his attention.

The mission will be furnished with letters of introduction and recommendation to her Majesty's ambassador at the Porte; and the Council have no doubt that his excellency will readily provide them with the proper ferman, to insure their good reception in the Turkish provinces of Asia Minor, as well as with letters to her Majesty's agents at the several towns in the interior, where they may be resident.

It is fully understood between the two Societies who provide the funds for this expedition, and on whose joint account it is undertaken, that although Mr. Ainsworth will more especially conduct the inquiries for the Royal Geographical Society, and Mr. Rasám those for the Society for Promoting Christian Knowledge, and although both Societies are convinced from the well-known character of these gentlemen, and from the experience they have already had of each other as travelling companions, that the utmost cordiality and community of opinion will subsist between them, yet, to preserve a general unity of action and to pro-

vide for possible events, the primary controul and direction of the expedition is to rest with Mr. Ainsworth, in whose hands will be placed the power and discretion of drawing upon England for the necessary funds, in such proportions and on such occasions as they may be required.

In proceeding across the continent of Asia Minor to the banks of the Tigris, the first point which the expedition will make for is the city of Ḳaïsaríyah, or Cæsarea ad Argæum. For this purpose Mr. Ainsworth will be guided by the information which he may obtain at Constantinople as to the facilities that may offer themselves on landing on the southern coast of the Black Sea; that is, whether he may be induced to prefer the beaten track by Angora, or whether by being landed at or near Sinope, he could not trace the whole, or nearly the whole, course of the Halys (Ḳizil Irmák) previous to reaching Ḳaïsaríyah. The more accurate determination of the upper course of this river and also of its source (if this can be accomplished without inconvenience), is considered as coming within the objects of the expedition.

By whatever line Mr. Ainsworth may reach Ḳaïsaríyah he will endeavour to ascertain the elevation of as many points as he can along the line of his route; and particularly of the high table lands and their principal summits, such as Páshá Tágh, and Karájah Ṭagh, between Angora and Aḳ-seráï; to trace whether volcanic, or a continuation of the saliferous deposits extend between Aḳ-seráï and Yúzḳát; to establish the sites of any ruins said to exist in that district; and, if within reach, to fix the northern and southern extremes of the lake of Ḳóch-hisár.

The table lands, which form the chief characteristic feature in the physical conformation of this peninsula, attracted the attention of the Greek geographer Strabo, to whom we are still indebted for some of our most valuable information as to Asia Minor.

It has been suggested that the travellers, when at Ḳaïsaríyah, should ascend the Argæus. This has lately been effected to within a few feet of the summit, by one of our latest travellers in that country. Mr. Ainsworth will of course enter into communication with that gentleman in order to ascertain how far it may be requisite to repeat the ascent, and the occasion will not be omitted to examine particularly the effects produced in this neighbourhood by the earthquake of 1835.

When in the neighbourhood of Ḳaisaríyah, the attention of the expedition will be particularly called to the sources and course of the Melas (Ḳoremos, or Ḳará Sú), which in most of our maps has been made to join the Euphrates a little below Malatíyah; but both in the sketch map of Mr. Brant, who visited Garún and Ḳaisaríyah in August, 1835,* and more recently from the obser-

* Journal, vol. vi. p. 213.

vations of Mr. W. I. Hamilton, who was there in August, 1836, it is shown that no river flowing eastward to the Euphrates rises to the N.W. of Mount Argæus; and the latter traveller has proved that the Kará Sú, probably the Melas of Strabo, which rises about 5 miles to the westward of Kaïsaríyah, flows undoubtedly towards the Halys.* From Mr. Brant also we learn that the Tokmah Sú has one of its sources not far to the N.W. of Garún, but as the exact spot is not ascertained, and as there has long remained so much doubt with respect to the sources and course both of the Tokmah Sú flowing eastward to the Euphrates, and of the Kará Sú flowing westward to the Kizil Irmak or Halys, it is desirable that Mr. Ainsworth should bestow much attention on the topography of the neighbourhood of Kaisaríyah, in order to set the question completely at rest; and should he follow the valley or valleys of the Tokmah Sú to Malatíyah, he should notice how far this river is navigable above its junction with the Euphrates.

It would also be desirable to connect with this, if practicable, the identifying of the towns of Castabala, Comana Cappadociæ, and others, as marked in the Peutingerian tables, upon the Roman road from Cæsarea Mazaca to Melitene.

From Malatíyah Mr. Ainsworth will have to decide whether the expedition shall proceed direct to Mósul, by the track through Diyár-Bekr, and down the valley of the Tigris, by Hisn Keïfá and the Jebel Túr; or whether they will take the more westerly line, and after visiting and examining first the Núshan pass, where the Euphrates is hemmed in by, and passes through, the chain of the Taurus mountains; and secondly, the cataracts above Samosata, proceed by O'rfah, Harrán, and the Karájah Tágh, or Mons Masius of the ancients, to Márdín, Nisíbín and Sinjár, exploring on their way the Rás el 'Aïn, and 'Aïn el Jebel on the Khábúr to the W., and thence, if possible, reach Mósul by Hadhr on the Hawálí river. This last place has, we believe, only been visited by one European. It is supposed that several ancient sites will be found on this line with ruins and inscriptions; and those of O'rfah and Hárran should be well examined for reasons connected with sacred history. The fixing of the positions (where not already determined by the Euphrates expedition), by astronomical observations and the measuring of the elevation above the sea of all places, where such astronomical observations shall be made, will be of essential importance.

Arrived at Mósul, the principal attention of the expedition will be turned to the country of the Nestorian, Chaldæan, and Jacobite Christians on the eastern banks of the Tigris, and generally, as far as time and circumstances will admit, to the whole

* Vide the annexed Memorandum, by Mr. W. I. Hamilton.

range of the Carduchian and Gordiæan mountains, now comprehended under the name of Kurdistán.

For more detailed instructions respecting the inquiries to be pursued, especially by Mr. Rasám, but jointly and severally also by the two travellers, into the state of the Nestorian and Jacobite Christians dispersed over this country, we refer you to those which you will receive from the Society for the Promotion of Christian Knowledge; but the Council of the Royal Geographical Society are by no means insensible to the importance of this object of your research, as eventually conducive to the introduction of civil and religious instruction amongst a Christian people so long established in this most interesting part of the Asiatic continent; and they presume that you will make it your business to inform yourselves of the general state and condition of these communities, of their religious establishments, of their population, wealth, agriculture, commerce and occupations; the state of education prevailing amongst them, the liturgies they use, the peculiar tenets they profess, and the various languages and dialects which they write or speak, and what historical records they may possess of their original emigration.

Special attention is recommended to the accurate orthography of the names of places, rivers, mountains, &c., stating them in the Arabic character throughout your whole journey; noting likewise, whenever it may occur, the difference of names in the different languages spoken in the same place by the natives; and copying accurately any inscriptions, particularly Greek, which may be found.

You will be empowered to employ a portion of the funds, placed at your disposal, for the purpose of purchasing or copying any MSS. of historical or religious interest which you may be of opinion it may be desirable to have here. This Society, however, understands that the funds available for that special object will be separately provided by the Society for Promoting Christian Knowledge.

It would be superfluous here to enumerate in minute detail the particular sites,—whether towns, rivers, mountains, or lakes, which it is hoped you may be able to visit and explore during your journeyings in Kurdistán. This must necessarily depend upon circumstances beyond the controul and cognizance of the Society; and you must throughout be guided by the information you receive as to the lawless or peaceful state of the different tribes of independent Kurds. Suffice it to say that the points which occur to the Society, as the chief desiderata to improve our knowledge of the geographical features of Kurdistán and its vicinity, are the E and W. banks of the Tigris between Mósul and Diyár-Bekr; the obtaining distinctly the names of all its tributaries and the precise

points of junction with their recipient; the range and heights of the Jáwár, and most remarkable mountains; the course and sources of the great and little Záb rivers, and their various feeders; of the Khábúr and its junction with the Tigris (as there is reason to believe that all our maps are wrong on this point); the lakes which they may rise from, or which are traversed by them, and the more precise determination of the place, apparently a little N. of Jezírah, where the Tigris is hemmed in on the E. and W. by the high lands which fix one of the most important points in the route of the "Ten Thousand." Mr. Ainsworth will, of course, pay particular attention, wherever he may come upon it, to the illustration of this campaign, so important to the geography and history of this part of the continent, which on his homeward route he may be enabled to trace to the sea at Trebizond. Major Rennell's Geography of Western Asia, and his "Retreat of the Ten Thousand," will be most useful in directing his attention to the passages in ancient writers, which will receive elucidation from his researches, and in pointing out many matters for inquiry; and all the topographical notices of Strabo relating to this district should be minutely compared with present appearances on the spot.

The expedition will also explore and ascertain the site of Sért, where ruins and inscriptions may probably be found, proving the existence there of an ancient city (quære Tigranocerta), those of 'Amádíyah (the seat of the noblest Kurd tribes), with its lead-mines—Júlámerk; Ráwánduz; the approaches to, and the field of Arbela. We shall be glad to have, also, all the details you can collect of the Nestorian and Chaldean tribes of the Tiyárí and the Hákarí district; of the iron and lead mines in the neighbourhood of Júlámerk; and it is recommended generally to examine the mineral resources of this district with a view to its supplying coal for the navigation of the Tigris by steam; or if not coal, would it afford other fuel?—to ascertain the highest point of the range of hills between the Mús mountain and the Aïágha Tágh or Zagros;—to trace the direction and limits of the Zákú range, and to determine the position, and measure the elevation of the Peak of Ráwanduz, distant about 70 miles, E. by N., of Mósul, and probably in sight from that city, and also from Arbela. It need hardly be mentioned, that attention should be paid throughout your journey to objects of natural history, and especially to geology and botany.

If, by means of joining a caravan, or by other arrangements, you should be able to cross the mountains which form the boundary between the dominions of Turkey and those of Persia, and which are said to bear oaks producing the finest gall-nuts of the East, it would be very desirable that you should visit, and, if pos-

sible, make the circuit of the great lake of Urmíyah, in the province of Azerbáïján; and determine, astronomically, the latitude of its north and south points. Various tribes of Nestorian and other Christian communities are believed to dwell upon its western shore.

The political and moral state of the tribes of Mohammedan Kurds throughout this district, their languages, superstitions, and other peculiarities, will also, of course, not escape your observation; and it would be desirable to verify the reports concerning the Yezídís, or Fire Worshippers, or *Shaïtan perest*, or Devil Worshippers.

The next object of your attention, and one to which the Society attaches great interest, is the lake Ván, Arsissa Palus of Ptolemy, and the Lacus Mantianus of Strabo, occupying a large and elevated plain, said to exceed 5000 feet above the level of the sea, between some of the principal feeders of the Tigris and those of the Murád Sú, or main confluent of the Euphrates.

The elevation of the surfaces of these two lakes above the sea; their depth, at any point where it can be ascertained, and the specific gravity of their waters; the astronomical determination of the N., S., E., and W. limits of Lake Ván, and the elevation above it of Sipán Tágh, will here be among the chief objects of your inquiry.

Having completed the circuit of this lake, and noted its various peculiarities, and having explored the Bitlís and Se'rt rivers, you will cross the Arghí Tágh, or eastern extremity of Mons Niphates, endeavouring to ascertain whether there are any easily practicable passes through this range, and generally, what was the most probable route from Mount Ararat, to the plains of Mesopotamia. If circumstances are favourable to the attempt, you will endeavour to ascend one or both of the heights of Ararat, if possible from the S.W. side, as Parrot has already effected this from the eastern side. Descending thence through the Báyazíd country, you will follow the Murád Sú, availing yourselves of such opportunities as the country may offer, to visit occasionally the heights forming the southern boundary of the valley of Táráberan; some of which are supposed to be of a volcanic nature; also the sources of the Erzen, and its subterraneous course between the lakes of Arethusa and Zoroanda. One of the passes through the heights will lead you to Arghanah Ma'den and the principal source of the Tigris; the forests in whose neighbourhood are said to have furnished Alexander and Trajan with the wood for building their floats. From this point you will have no difficulty in regaining Malatíyah and the points on the Euphrates from which you may have started.

Although the Society cannot contemplate your having sufficient

time at your disposal for extending your journey into Armenia, or even to Erzrúm, it would, of course, be very desirable that you should do so, if it be found practicable. At all events you will avail yourselves of the opportunity of communicating with Her Majesty's Consul at Erzrúm.

Another object of research has also been suggested, namely, Khúzistán, or Susiana, a considerable part of which has lately been visited by Major Rawlinson, but not under those advantages, in a scientific point of view, which will be at your disposal. The same observations, however, which I have made in reference to your proposed visit to Armenia, will apply also to this district.

It is very possible, likewise, that the time and means at your command may be inadequate to the accomplishment of all that has been pointed out to you; of this you will be the best judge when you are in the country: the selection of the least known and most important points is therefore left to your discretion, as well as the order in which the several objects of research are to be attempted, remembering always, that the chief objects are, the making acquaintance with the Nestorian Christians, and the examination of the country which they inhabit.

You and Mr. Rasam are both such experienced travellers, and you both already possess so much general knowledge of the country you are about to visit, and Mr. Ainsworth, in particular, is so well aware of the objects which will mainly interest the Royal Geographical Society, that it is quite unnecessary to enumerate more particularly the points deserving your attention. Nor would the Council wish to say more upon the subject than to express their confident hope, that the result of your inquiries, in addition to the rich harvest of general and physical knowledge, which you will acquire, will furnish also much new matter, specially illustrative of portions, at least, of the memorable expeditions of Xenophon with the "Ten Thousand;" of those of Alexander, Lucullus, Trajan, Julian, and Heraclius. With this view it will be very desirable that, previous to setting out, Mr. Ainsworth should be provided,—if not with the best ancient and modern works illustrative of the countries which he will visit, at least with transcriptions of the most important passages of the ancient writers which refer to these localities: a frequent comparison of these and also of modern authorities, with actual observations made on the spot, will generally point to matters for investigation which might otherwise be overlooked.

Extracts of names of places from Ptolemy, and from the several ancient itineraries, with the distances, will also be of great use, as it is presumed that many of these places will be identified by the coincidences of the present names with those in the Greek geographer, and other remote authorities. Accurate attention to this part of his instructions, assisted by a well-directed study of the

details of ancient history, and of the revolutions to which this part of the world has so frequently been subject, will enable Mr. Ainsworth to illustrate in many instances what is now obscure, and will ensure him the grateful thanks of all men of learning.

Travellers have also mentioned that many ancient coins are to be collected in Kurdistán. It does not enter into the views of the Royal Geographical Society to make any acquisition of this description; and they would not willingly see that any considerable portion of the funds at your disposal were diverted from their special object to the purchase of these or similar objects of antiquity. At the same time they are aware that monuments of that kind are sometimes of importance in illustrating points of comparative geography; but for this purpose a special note must be kept of the localities where they are found: you will therefore use a sound discretion when opportunities may offer to purchase coins, and you will bear in mind that every outlay on this head must be held in subservience to the main purpose of your expedition.

In regard to astronomical and other instruments, the Society understand that Mr. Ainsworth is already in possession of, or will be furnished with, the following, viz.:—

1 Kater's azimuth and altitude circle, 3½ inches in diameter, and stand.

1 sextant of 7 inches radius.

1 pocket sextant.

3 chronometers (Molyneux), Arnold and Dent.

1 three-feet telescope, mounted (Dollond).

2 artificial horizons; 1 of mercury, 1 with a spirit-level.

2 mountain barometers (Newman, Troughton and Simms), both compared with the standard at the Royal Society.

6 thermometers; 2 of which fitted for measuring heights by boiling water.

1 Kater's compass, with azimuth sights.

3 pocket-compasses.

1 clinometer.

The requisite apparatus, with 3 pairs of needles, for measuring magnetic dip and intensity.

Nautical Almanacks for 1838, 1839, and 1840.

Astronomical Tables and the most useful books of reference; and the various maps connected with the country.

Road books, note books, squared paper, &c.

It is strongly recommended that all observations be entered immediately in a book kept for that purpose, with the state of the weather—barometer and thermometer—and a note as to whether a good or indifferent observation;—that a meteorological journal be constantly kept, registering the height of the barometer at least twice a-day (9 A.M. and 3 P.M. will be the best hours), and a series of hourly observations, for 36 hours at the equinoxes and the solstices; observations for variation are also of great importance

to enable us to trace the curves of magnetic variation throughout this part of the world.

The 3 feet telescope will, it is hoped, enable Mr. Ainsworth to obtain his longitude at Mósul by occultations, when it must be remembered that a *central meridional* occultation is the most favourable observation of this sort; if by moon-culminating stars, it must not be forgotten that the telescope should be adjusted to the meridian, or the observation will be liable to error; but until leisure be afforded for such observations, it will be better to assume the longitude of Mósul (his head quarters) at 43° E. of Greenwich, as determined by Mr. Rich, and to measure meridian distances from it by his watches. Thus all positions will be *relatively* right, and must move together with Mósul, should its position hereafter be found to be erroneous.

You are aware that the funds disposable for this expedition are 1000*l.*;—500*l.* of which are provided by the Society for the Promotion of Christian Knowledge, and 500*l.* by the Royal Geographical Society. This sum of 1000*l.* will be at Mr. Ainsworth's disposal, for the objects of the expedition as above described; but you will be pleased to bear in mind, that it is understood that this sum is to supply the whole of your expenses for the space of 2 years from the period of your quitting England for Constantinople; and Mr. Ainsworth will regulate his drafts accordingly.

By order of the Council,

John Washington,
Secretary.

1st June, 1838.

Note by W. I. Hamilton, Esq.

By landing at Ereklí or Heraclea Pontica, Mr. Ainsworth might proceed to Angora through an interesting and almost totally unknown country; in which case I should recommend his proceeding along the seashore to Amáşerah or near the mouth of the Parthenius or Bártín, and thence to turn inland to Za'farán Bólí, which I have reason to believe is a large and highly flourishing place.

Between Angora or Engúrí and Ḳaïşsár the principal object of investigation will naturally be the course of the Halys and its tributaries; but it would also be highly interesting to ascertain the nature of the rocks which form the hills of Páshá Ṭágh, and perhaps also Rayah Ṭágh, which rise above the great central plateau of Asia Minor between Engúrí and Ak-seráï, and which are the summer residence of the Kurd tribes which inhabit the plain of Ḳóniyeh during the winter, and to ascertain whether they are volcanic, or a continuation of the saliferous deposits which extend between Aḳ-seráï and Yúz-ḳát.

Between Ḳír-shehr and Nemb-shehr it would be well to inquire for a place called U'cháyúk, upon the mountain of Bóz-tágh, where, I was informed by a Turkish Imán, were some curious remains and many columns.

The red sandstone formation through which the Kízil Irmak flows between Angora and Ḳaïşariyah, as well as the deposits of rock salt,

will of course claim some share of Mr. Ainsworth's attention; and I would particularly point out the rock salt deposits of Hájí Bektásh, which are also situated between Kír-shehr and Nemb-shehr.

If Mr. Ainsworth determines to ascend Mount Argæus it can only be done by procuring some Armenian guides from Everek-köi, at the S.E. foot of the mountain, and about 10 or 12 hours distant from Kaïsariyah: I do not believe the ascent to be practicable from any other side. If he then wishes to reach the extreme pinnacle of the mountain, he must be provided with a scaling ladder 30 or 40 feet high, or with a grappling of some kind, which he may heave up so as to fix itself in the rock-above, and then swarm up the loose knotted rope attached to it. Neither of these apparatus will he be able to procure upon the spot, and perhaps hardly at Kaïsariyah.

With regard to the effects produced in the neighbourhood of Cæsarea by the earthquake of 1835, there is not much to be seen in the town itself, with the exception of the walls of some houses which are cracked; but about 6 or 7 miles from Cæsarea, on the road to the Greek convent of Yanár Tásh or Taxiarcha, there is a cliff overhanging a small village called Beli-Yasí, a large portion of which was thrown down during the earthquake upon the village, burying several houses and killing many of the inhabitants.

The Kará-sú, which rises in the marshy plain 5 or 6 miles to the westward of Cæsarea, and which is probably the Melas of Strabo, flows undoubtedly into the Halys. The river, which falls into the Euphrates at Malatíyah, if it has its origin anywhere near the eastern foot of Mount Argæus, must rise at a considerable distance from the mountain, for, in proceeding round Mount Argæus on the east side, I perceived no trace of any stream or water except such as flowed N.W. or S.W. Mr. Ainsworth would probably find the sources of the river, which flows eastward, to the south of the road leading from Cæsarea to Malátíyah.

The priests at the Greek convent, 3 hours E. by S. from Cæsarea, where the bishop resides, spoke of some considerable remains at a place called Eúrán-shehr, 3 days' journey from Cæsarea to the eastward (can this be Garun?); and ten hours beyond that, of two lofty rocks 40 or 50 feet high covered over with Greek inscriptions.

If Mr. Ainsworth took the overland road from Constantinople he might, beyond Eskí-shehr, visit the interesting mines or pits of Meerschaum or Ecume de Mer, between Eskí-shehr (Dorylæum) and Sevríhisár; and from thence striking south he might explore the *two* sources of the Sangarius, one of which must be near the place marked Pæmanene in Colonel Leake's Map, and W.S.W. from Sevrí hisar, and which joins the other branch flowing from the south, between Akekám and Bálá hisár. The tracing of these rivers would throw great light upon the march of Manlius in his Gallo-Grecian expedition.*

If, on the other hand, Mr. Ainsworth lands at Sinope, he cannot do better than trace the Halys as nearly as possible the whole way from Báfirah to Cæsarea.

1*st June*, 1838. W. I. H.

* I understood from the Turkománs of Hamah Hájí, 6 hours S.E. from Alekám, that there was a route across the Harmáneh to Akserai.

ACCESSIONS TO THE LIBRARY,

27th MAY, 1839.

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Austria.—Travels in Austria, Russia, and Turkey, by the Rev. C. B. Elliott, M.A. 2 vols. 8vo. London, 1838	Rev. C. B. Elliott.
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Belgium.—Essai sur la Statistique Générale de la Belgique, par Xavier Heuschling. 8vo. Bruxelles, 1838 .	M. P. Vandermaelen.
——— Limbourg, Dictionnaire Géographique de la Province de. 8vo. Bruxelles, 1837. . . .	Idem.
——— Luxembourg, Dictionnaire Géographique du. 8vo. Bruxelles, 1838	Idem.
——— Dictionnaire des Hommes de Lettres, des Savans, et des Artistes de la Belgique. 8vo. Bruxelles, 1837	Idem.
British Isles.—The Silurian System, founded on Geological Researches in the Counties of Salop, Hereford, Radnor, &c., by R. I. Murchison, Esq. 2 vols. 4to. London, 1839	R. I. Murchison, Esq.
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——— Report of the Commissioners for the Commutation of Tithes. 1838. Pamphlet, 4to . .	Captain W. Buller, R.N.
Faroe Islands.—The History of their Inhabitants, by C. C. Rafn. 8vo. Copenhagen, 1833 . . .	Prof. C. C. Rafn.
France.—Annuaire des Marées des Côtes de France, pour l'An 1839. 12mo. Paris. Dép. de la Mar. . .	Mr. A. M. R. Chazallon.
——— Mémorial du Dépôt Général de la Guerre. Tomes III., IV., V., VI. 4to. Paris.	Le Dépôt de la Guerre.
Germany.—Das Germanische Europa, von Dr. E. Mendelssohn. 8vo. Berlin, 1836	
——— The Spirit of her History, Literature, Social Condition, and Natural Economy, by Dr. Bisset Hawkins. 8vo. London, 1838.	Dr. Bisset Hawkins.

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GREECE.—The Spirit of the East, by D. Urquhart, Esq. 2 vols. 8vo. London, 1839	MR. COLBURN.
ICELAND.—Voyage en Islande et au Groënland en 1835-6, publié sous la direction de M. Gaimard. 7 livraisons des planches. Paris, 1838	LE DÉPÔT DE LA MARINE DE FRANCE.
——— RELATION d'un Voyage dans la Mer du Nord aux Côtes d'Islande, du Groënland, de Ferro, &c., en 1767 et 1768, par M. de Kerguelen Tremarec. 4to. Paris, 1771	
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——— ——— Del Sistema Metrico della Citta di Napoli, da F. Visconti. 8vo. Naples, 1838 . . .	IDEM.
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——— Excursions in the Interior of Russia, by Robt. Bremner, Esq. 2 vols. 8vo. London, 1839	MR. COLBURN.
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SAXONY.—Mittheilungen des Statistichens vereins das Königreich Sachsen (*in continuation*). 1838. Dresden	DR. VON SCHLIEBEN.
——— METEOROLOGICAL Report of Saxony from 1827 to 1838 ——— MEDICAL Statistics in Saxony for 1838.	THE STATISTICAL SOCIETY OF SAXONY.
SWITZERLAND.—Savoy and Piedmont. Handbook. Murray, 1838	

AFRICA.

ABYSSINIA.—Reise in Abyssinien, von Dr. Eduard Rüppell. Frankfort, 1838	DR. E. RÜPPELL.
——— REISE in Abyssinien im 1836, A. von Katte. 8vo. Stuttgart, 1838	
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——— DESCRIPTION Nautique des Côtes de l'Algérie, par M. A. Bérard, Capitaine de Corvette . .	LE DÉPÔT DE LA MARINE DE FRANCE.

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I.

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Salmon, Wm. Wroughton, Esq.
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Yates, Rev. James, M.A., F.L.S. and G.S.
Yates, John Ashton, Esq.
Yates, Joseph Brookes, Esq.
Young, George F., Esq., M.P.
Young, James, Esq.
Young, Charles Baring, Esq.
Yorke, Lieutenant-Colonel, P.S.

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1832.—Mr. John Biscoe.
1833.—Captain Sir John Ross, R.N.
1834.—Lieut.-Col. Sir Alexander Burnes, F.R.S.
1835.—Captain Sir George Back, R.N.
1836.—Captain Robert Fitz Roy, R N.
1837.—Colonel Chesney, R.A., F.R.S.
1838.—Mr. Thomas Simpson.
Dr. Edward Ruppell.

ADDRESS

TO THE

ROYAL GEOGRAPHICAL SOCIETY OF LONDON;

Delivered at the Anniversary Meeting on the 27th May, 1839,

BY

WILLIAM R. HAMILTON, Esq., F.R.S.,

President.

Gentlemen,

In meeting you on this, the eighth anniversary of the foundation of the Royal Geographical Society, and in resigning into your hands the honourable distinction of being your President; and, in the entire confidence that you have fixed your choice on one not, I would fain flatter myself, more anxious and zealous for your prosperity and for the advancement of the science which you cultivate, but who is far better qualified, than I have proved myself, to fulfil the duties of the situation, I shall proceed to lay before you a few observations on the present state of the Society, and on the progress which geographical knowledge has made during the last year, from individual exertions, from your own labours, and from those of our rivals in the race of honour we are engaged in on the continent of Europe, and in other parts of the world; and I shall allow myself such observations as may occur to me, as not undeserving of your attention, on the increasing importance of geographical knowledge to the social and political condition of man.

The finances of a Society like the present, existing altogether on private subscriptions, will always form an object of paramount interest. I am happy to say, on reference to our balance-sheet, that we have every reason to be satisfied on that score. Our receipts in the preceding year, exclusive of the £500 received for a special purpose from the Society for Promoting Christian Knowledge, amounted to the sum of 1500*l.*; and the number of members on our list exceeds 650.

Our library, both of books and maps, has received large additions since the last anniversary. It is still, however, very far from what it ought to be; and I hope that the liberality with which members are allowed the use of it will continue to stimulate a corresponding liberality on the part of those, who are in a state to augment the collection by voluntary contributions.

We have received, among many other donations to the library, "The Silurian System," founded on geological researches in some of the western counties of England, by Mr. Murchison; some additional sheets of the Ordnance Survey of England, and the Townland Survey of Ireland; various charts from the Hydrographic Office at the Admiralty; and princely donations from the Depôt de la Guerre, and the Depôt de la Marine, of France, and from the Dépôts Topographiques of Wurtemberg and Austria, for the latter of which we are also much indebted to our zealous honorary member, Baron C. Hügel; several valuable documents from the Court of Directors of the East India Company; and we have this day received from Capt. Fitz Roy, the "Narrative of the Surveying Voyages of Her Majesty's Ships Adventure and Beagle, between the years 1826 and 1836, describing the examination of the southern shores of South America, and the Beagle's circumnavigation of the Globe;" besides many excellent maps from Mr. John Arrowsmith, the Transactions of the Imperial and Royal Academies of St. Petersburg and Berlin, Paris and Lisbon, and numerous donations which are recorded in the volume of our Journal now issuing from the press.

But here, Gentlemen, we are subject to a very serious inconvenience, the whole extent and nature of which ought not to be withheld from you. We have long suffered from the straitened room available for our public business, and most particularly for the accommodation of members who may wish to consult the library, whether for instruction or recreation. Our books and maps are piled in heaps on the chairs and tables abovestairs in most deplorable confusion; and although every pains are taken, and effectually taken too, by your Secretary and by the Librarian, to preserve some degree of order amongst the various articles of your property, which, from their high value and usefulness, do ill deserve such treatment, still, every day and hour furnish instances of the evil occasioned by the want of a larger apartment for reading, for drawing, for comparing and construction of maps, for the exhibition of instruments, for the reception of strangers, and for what is by no means the least useful or the least agreeable of our pursuits, the mutual exchange of ideas amongst the members of the Society, for the promotion of the cause which has so happily and so honourably brought us together. I took occasion in my address to you last year to advert pointedly to this

subject, in its practical application to the progress of geographical inquiry: since that period the Council have been indefatigable in attempting to provide a remedy; but hitherto, I regret to say, without success. You need not be reminded, indeed you must all feel the necessity, of our not removing farther than we now are from the centre of the active movement of the metropolis, nor farther from the great public offices, from our daily intercourse with which we derive so many advantages; the suspension of which intercourse would at once deprive us of much valuable assistance, and would occasion great loss of time. The Council have visited various sites which would be eligible in themselves, if available, and we have entered into, or rather commenced, several negotiations for the attainments of this object: but all have fallen to the ground from one or the other of two causes; either the space offered was too small, or the expenditure it would entail upon us was too large. The annual balance-sheets show to the Society that we have a considerable sum of money in the Funds, which might be available for this purpose, and this, indeed, was one of the main objects the Council had in view when they resolved to fund a large portion of the receipts during the first years of our institution: and such is our conviction of the imperious necessity of providing suitable apartments for the Society, that we have even contemplated the expediency of applying the whole of this fund, in addition to a considerable increase of annual rent, for this one object; confident as we are that a very large portion of such outlay would rapidly be replaced by a large accession of new members. It might indeed for a few years cripple our means for fitting out exploring expeditions on the scale we have hitherto acted on; but we should not despair of speedily being enabled to resume that practice, should it be thought advisable, if we could once secure to ourselves a permanent, convenient, and spacious home, if we could add to our *name* a *local habitation.*

As the great desideratum in a new establishment will always be a large and commodious room for these Meetings, it has even been suggested to the Council that, in the impossibility of suiting ourselves permanently and immediately with *all* we want, we might find it advisable to take temporary apartments in this neighbourhood for the accommodation of Members generally, and for the *daily* business; whilst the courtesy of our present landlords would still secure to us the use of *this* room for the Evening Meetings.

Whatever inconvenience might occasionally be felt by such an arrangement, it would be infinitely less, and of much less consequence to the essential interests of the Society, than that which is felt now.

The hand of death during the last year has removed from our Society two persons, to whose services in the cause of Geography I must call your attention. Vice-Admiral Sir John T. Rodd, late a Member of the Council, was son-in-law of one of our most distinguished geographers, Major Rennell, who was indebted to him for many of the facts inserted in his well-known Current Charts; Sir John Rodd was also a donor of several works to our library. The Baron de Hamelin, a Foreign Honorary Member, at the head of the Depôt de la Marine of France, deserves also to be gratefully remembered by us—not only for his zeal in the promotion of scientific Geography, but for the many valuable maps and books which have been presented to us by the establishment over which he presided.

Positive proofs of the importance of accurate geographical knowledge are not wanting, many must at once occur to every one who hears me; nor are the negative proofs of less frequency, or of less weight.

The history of nations might furnish us with a long list of disastrous occurrences, owing to the ignorance of localities, in those on whom has hung the fate of armies, from the ignominious tale of the Fauces Caudinæ to the defeat of Saratoga.

What is it which has occupied all minds, exercised thousands of writers, embarrassed the most expert diplomatists of modern times, put as it were on the cast of a die an unnatural, and almost a civil war between two kindred nations, threatened to interrupt the progress of civilization over the half of the new world, and to throw into confusion the great commercial interests of the globe? What but the ignorance of the course of one or two rivers, of the range of certain hilly districts from which they derived their streams; and the uncertainty in geographical nomenclature whether the specific name of a bay, which bathes a small extent of coast, occurring in a diplomatic document, is to be considered as identical or not with the vast ocean of which it forms a part? To this must also be added the ignorance which prevailed, at a period fifty years ago, of the extent, configuration, and boundaries of our own provinces. You cannot fail to receive the allusion as stamping at once the inestimable value which, for the repose of nations, as well as for the advancement of science, we ought to set on geographical research. In another quarter of the world now under our dominion, I mean the large district of Assam, it is only, I believe, of very late years, that our botanists and naturalists have ascertained that the tea-tree, an indigenous plant of that soil, may be cultivated, so as to divert, perhaps in a few years, the entire direction of a trade which during the last half-century has poured so many millions into the Exchequer.

We all remember the fatal consequences, which ensued to our army and navy in 1827, when they had to penetrate the unknown swamps and rivers of the Birman territory.

"When at the commencement of the Birman war" (says Capt. Pemberton, of the Bengal Engineers), "our ignorance of the whole frontier became manifest, the impolicy, the shortsightedness of not having instituted, even by force, if requisite, a proper examination of the mountain passes, flashed upon the mind of even the most careless observer; and its lamentable effects were afterwards shown in an expenditure of life and treasure without parallel in the annals of Indian warfare." Another proof, if proof were wanting, to be added to those lately brought forward (by Major Jervis, in his address to the British Association, on the present state and progress of the Trigonometrical Survey in India), of the absolute necessity of a complete survey, to ensure the good government of any country.

When our troops landed in Egypt, in 1801, they suffered for a time from want of water on the coast, though, eighteen hundred years before, Cæsar had told us that it was to be found all along the coast by digging for it to a very inconsiderable depth.

On that same coast how nearly was the gallant Nelson deprived of the glorious fruits of his anxious nights and days, and indomitable perseverance, by his ignorance of the shoals, near which was anchored the enemy's fleet!

Minor misfortunes of this kind are still of every-day occurrence. There are few parts of what is called the "known world," which are yet distinctly known as they ought to be known. Every new survey corrects the thousand and one errors of omission or commission of those which have preceded it, even in the most frequented seas. And as the commerce of the world, goaded on by the thirst of adventure and profit, "æstuans angusto limite mundi," is perpetually seeking out new marts of exchange, or struggling to unlock the bars by which the jealous fears of some, and the narrow and superstitious prejudices of others, have hitherto excluded it from many of the richest countries and finest harbours in the world, this department of geographical knowledge, namely, Hydrography, becomes every day more and more indispensable, as it is that in which minute accuracy is most required.

In performing the most agreeable of the duties which devolves upon your Council, namely, in conferring the Honorary Medals provided out of the annual Royal Donation, the Council, as you have this morning heard from your Secretary, have hitherto restrained themselves to presenting one medal to the individual, whom they conceived to be the best entitled to this distinction; and this has been accompanied with the further present of the difference between the value of the metal and the

amount of the Royal Donation. On the present occasion, and for the future, if the same should be considered advisable by their successors, they have resolved to present two medals of equal value and equal honour, to the two gentlemen whom, on the principles hitherto acted upon, they may judge to have rendered the most distinguished services to the cause of Geography. And, accordingly, the medals for this year have been awarded by the Council, one, which is called the Founder's Medal, to Mr. Simpson, the officer of the Hudson's Bay Company who has yet reached the farthest point on the north coast of America—east and west of the Coppermine River, and whose exertions, together with those of Mr. Dease, have been so well appreciated by you; and the other, or the Patron's Medal, to Dr. Edward Rüppell, of Frankfort, for his travels and researches in Nubia, Kordofan, Arabia, and Abyssinia.

I shall avail myself of this opportunity to lay before you a few observations on the true principles of conferring these honorary medals for distinguished eminence in the pursuit of science generally; equally applicable, as I believe them to be, to similar acts in this and other departments of knowledge.

When the founder of an honorary reward of this description shall have laid down, either by grant or bequest, certain distinct rules for realizing his donation, such rules must, of course, be religiously adhered to. But when sufficient means are annually available to a literary or scientific society, for the purpose of giving an honourable distinction, without the precise mode of its being prescribed, I should be inclined to submit to your judgment whether it might not be advisable to deviate in some manner from the course usually pursued.

This course has been in almost all instances to have a medal struck, representing on one side of it the head of the donor, and, on the reverse, either some appropriate allegorical device, or wreath, within which may be inscribed the name of the person receiving it. Each medal is thus, in one sense single, or unique of its kind; whilst, in another sense, all the medals so given are merely repetitions one of the other, the only variation being the name of the receiver. Now it is obvious that such a medal can hardly be considered as in itself *a distinction of honour.* The act by which it is conferred is, indeed, as far as it goes, an honourable distinction; but the medal itself, being necessarily locked up and preserved in the possessor's own keeping, does in no way whatever contribute to extend his fame or good name, either amongst his contemporaries or to posterity; that is, it does not spread abroad the fact of the honour having been thus bestowed upon him. It is not to him an efficient source of *honour;* and, in truth, the greater is its material value, that is, the greater the liberality to which it owes its existence, the less

is it seen or known, the more carefully must it be guarded from being lost or purloined during the life of the possessor, who may strictly be described in the words of Horace, 'Magnas inter opes inops;' and, after his death, the greater is the probability that it will, sooner or later, find its way to the furnace. Under this system, many of those who hear me may, from the interest they take in Geography, recollect that medals of honour have been awarded from this chair to Ross, to Back, to Fitz Roy, to Burnes, and to Chesney; but how few, out of a particular range of study, are aware that similar marks of distinction have within a few years been bestowed, by other Societies, on a Faraday, a Hallam, an Ivory, a Scott, a Herschel, or a Davy!

To obviate these objections, I am of opinion that, instead of giving one gold medal, we ought to expend the means at our disposal, when they are sufficient for the purpose, in having the portrait of the receiver engraved upon the die; we should present him with one impression in silver, and strike off at least an hundred others in bronze, for circulation amongst the various public museums here and abroad, and also for indiscriminate sale for the supply of private collections.

By an arrangement of this character you will at once see that, through the extended circulation of such a monument, the honour, fame, name, and success of the receiver are not only made known throughout Europe, but they are perpetuated, together with a delineation of his features, possibly to the latest posterity. Such is the bronze medal, which I now hold in my hand, of the celebrated navigator, Captain Cook, which was struck, with his portrait, by the Royal Society, as a testimony of their admiration of the services he had rendered in the career of discovery. But I fear this is an unique instance of the kind in this country.

I hope, gentlemen, you may live to see this practice, originated in this country, rapidly and generally applied by our own literary and scientific societies, and soon imitated by our sister establishments on the Continent.

I would fain mention a strong additional argument in its favour, namely, the encouragement it would give to a department of the Fine Arts which has long been neglected by our countrymen, but of the revival of which, I think I see the approaching dawn. This is, indeed, I am aware, a consideration foreign to the purposes for which we are here assembled, but you will not approve it the less, because it will do good out of the sphere of your own more immediate pursuits. Science, literature, and the arts, are the great evidences by which the development of the intellectual power of men is made most manifest. Apart from a conviction of our moral duties and our religious responsibilities, these are the three Graces, which elevate one man above another, one

nation above another, one era above another. In all the most prominent periods of history they have been born, have flourished, have decayed, and have revived together; and though special circumstances may now and then intervene, within limited periods, or in particular portions of the world, to the prominence of one of them, and the disparagement of another, this is not the ordinary course of national progress; it is a phœnomenon, the existence of which we should not hail with satisfaction, and we ought rather to view it in the light of a perturbation, which, like those which occur in a higher region, are righted by the action of the same principles by which they are produced.

This allusion to the execution of modern medals in aid of the pursuits of Geography prompts me to say a few words on the already intimate connection between the science of Numismatics, as pursued by the antiquary and the scholar, and the knowledge of comparative or historical Geography. In the first place, the professor of Numismatics arranges his medals upon a strictly geographical system—he begins with the most western parts of Europe, with Lusitania; he then proceeds to Hispania and its several provinces; he then arranges those of Gaul and Britain: to these succeeds Italy, first north of the Po, then to Etruria and the south of that river, and on through Umbria, Latium, Campania, Apulia, Calabria, to Sicily and its islands. Having thus disposed of Western Europe, the Numismatist begins again with the Tauric-Chersonese, and proceeds regularly through European Sarmatia, Dacia, Pannonia, the two Mœsias, Thrace, its Chersonese, to Pæonia, Macedon, and Thessaly, with their adjacent islands. He then takes the eastern coast of the Greek peninsula, through Dalmatia, Illyrium, and Epirus, with the neighbouring islands, to Acarnania and Ætolia. This brings him again to the east by way of Locris, Phocis, and Bœotia, to Attica and her islands; he then takes up the Peloponnesus, with its several divisions of Achaia, Elis, and its islands, Messenia, Laconia, Argolis, and the central Arcadia. After which come the various islands of Crete and Eubœa, and the smaller ones of the Ægean, which have always been considered as belonging to Europe.

Of the medals or coins of the Asiatic countries and towns, we have first, beginning from the most northerly, those of the Cimmerian Bosphorus, and Colchis; continuing along the coast of Asia Minor, follow those of Paphlagonia, Bithynia, Mysia, and the Troad; down the western shores of Asia Minor, through Æolis, Ionia, Caria, and Lycia, and their several islands; then eastward through Pamphylia, Pisidia, Isauria, Lycaonia, to Cilicia, and the adjoining isles; next to these are the interior regions of Lydia, Phrygia, Galatia, Cappadocia and Armenia. The Numismatist then proceeds to Syria, its several districts

of Commagene, Cyrrhestica, Chalcidene, Palmyrene, Seleucis, and Pieria; then Cœlesyria, Trachonitis, Ituræa, and the Decapolis, or Haouran; concluding with Phœnicia, Galilæa, Samaritis, Judæa, and Arabia. We have then the remoter, and more inland districts of Mesopotamia, Assyria, Persia, Parthia, Bactriana, and Characene. Coming then into Africa, he takes successively the districts washed by the shores of the Mediterranean, from the Isthmus of Suez to the Straits of Gibraltar; these are Egypt, Cyrenaica, Syrtica, Byzacene, Zeugitana, Numidia and Mauritania.

I say nothing of the Consular coins struck at Rome during the Republic, or of those which are called Imperial, because, however important they may be for points of history or chronology, they are comparatively devoid of interest in reference to Geography.

The whole of the ancient world, well known to the Greeks or Romans, is thus brought successively into notice; and I believe it will be allowed by all, that the best Numismatists are also the best acquainted with the general character, as well as with the minuter details, of comparative Geography.

We may here, also, readily give the tribute of gratitude which is due to the travellers in a large portion of the districts above enumerated, for the correct fixing of many ancient sites of towns, which had before been looked for in vain, by the medals which have been collected on the spot, or in their immediate vicinity. Next to inscriptions found in situ, and bearing the name of the towns by which they were erected, these coins furnish us with the best criteria for identifying localities; and this fact should be particularly impressed on the minds of travellers, who may collect coins, that they may be aware of the importance of noting down carefully the places where they have acquired them.

Europe.—The progress of Geography in Europe can only be accurately marked by recording the accessions to the great topographical maps of each state now in progress, nearly in every country; yet, however unwilling to pass over the works of many laborious and highly deserving men, neither will time permit me, nor would it be fitting from this chair to enter into such details. It may be sufficient to remark, that several sheets have, during the past year, been added to their various surveys. In our own country, not to dwell upon the Ordnance Map of England, which is familiar to us all, and which now approaches its completion, the four northern counties only remaining to be surveyed, I would mention, that in the course of last summer several stations of the principal triangles have been completed in the north of Scotland, where the party remained till they were driven by the snow from the mountains

of Cape Wrath. And during this spring they have recommenced their labours on the north-eastern coast, and in the interior of Sutherlandshire, whilst another body of surveyors will proceed to complete the secondary points along the western shore, for the purpose of affording the basis for the hydrographical survey of that coast.

In Ireland the townland survey advances rapidly, and the maps of seventeen out of the thirty-two counties are complete. But I would wish to call your especial attention to a map of that country, just published in six sheets, on the scale of half an inch to a mile, which includes the whole of the Government survey, as far as it reaches, and is completed from the best of all the other materials which were available. This map. in which the physical features of the country are well represented, is intended to show the projected lines of railroads, and reflects high credit on Lieut Larcom, R. E., under whose immediate superintendence it has been drawn and engraved.

The labours of the Hydrographic department, under the direction of Captain Beaufort, R.N., one of your Council, and one of those who warmly and ably assisted Sir John Barrow, and others, in the original institution of this society, keep pace with the land survey of the British Isles. Parts of the east and west coasts of England, the Irish Channel, the east coast of Scotland, the coast of Wales, and the northern coast of Ireland, have been carefully surveyed; and the remainder is in progress. In addition to this, Captain Hewett is steadily engaged on his large chart of the North Sea, which, when completed, promises to be the most beautiful specimen of nautical surveying ever executed.

Although I have already called the attention of the Society generally to the presents which it has received from public institutions, or from private individuals, I cannot avoid the opportunity of thus testifying to Mr. Murchison the gratitude which, in common with all lovers of science, and of geography in particular, this Society must feel for the zeal, patience, and scientific ardour, which he has expended in the production of his very valuable and remarkable work, "The Silurian System." Mr. Murchison's chief object in this "labour of love" has, of course, been the elucidation of the geological phœnomena of that extensive district, comprehending certain border counties of England and Wales. But, besides the evidence which is brought forward to show that the Silurian region may serve as the type of a normal group of hitherto unclassified deposits, which there rise to the surface in successive ridges, and connect the coal formations and other overlying strata with the older slaty rocks, extending from the southern limits of Cheshire to the extremity of Pembrokeshire, and along with them the full survey of the operations, by which the surface of this part of our island has passed

from a submarine condition into dry land, and by which the present system of drainage has been effected, the work in question embraces a great mass of valuable physical geography, not the less interesting to us from its being limited to our own homes; and the whole offers a brilliant specimen, and an example, which we may hope will not be without its imitators, of what may be effected within a few years by the earnest and honest application of an ardent mind to the elucidation of one subject. We are all aware that a single plant, the minutest corpuscle, cannot be fully described without a complete knowledge of the whole physiological structure of the animal and vegetable creations.

Carl Ritter, in his Introduction to his *Erdkunde*, a work which has at once stamped its author as the father of descriptive geography, remarks, with satisfaction, that an attentive study of his own country, from the Oder to the banks of the Rhine and the Danube, had enabled him to appreciate the description of distant regions under analogous natural circumstances, as the intimate knowledge he had acquired of the basin of one large river, the Rhine, from its source in the Alps, through its lakes, and along the course it had formed for itself to the sea, inspired him with just and accurate views respecting similar districts in other parts of the globe; and his residence in Italy and on the shores of the Mediterranean had given him a general acquaintance with the influence and vital force of volcanic action, and the several relations which unite the sea and the land, the three kingdoms of nature, and the inhabitants of the earth. He was thus enabled, by the application of his own observations to the narratives of others, to treat philosophically a subject which embraced the physical construction of the whole surface of the globe; that is, its mountains, rivers, plains, valleys, steppes, and partitions of waters.

The new edition of the "Statistical Account of the British Empire," by Mr. M'Culloch, and that of the "Gazetteer of England and Wales," by the late Mr. James Bell, of Glasgow, which embodies all the recent municipal changes, the minute "Statistical Account of Scotland," now in course of publication, the "Memoir on the County of Londonderry," the "Report of the Commissioners on the Statistics of Ireland," and the "Tables of Revenue, Population, and Commerce," by Mr. Porter, of the Board of Trade, furnish a far more complete topographical description of our country than we have hitherto possessed.

But, whilst noticing this addition to our knowledge of the British Isles, I cannot avoid remarking the great want of a General Gazetteer, or Geographical Dictionary, in the English language. Looking at the materials now flowing in from every quarter of the globe, at the great government surveys in progress throughout Europe, and the increased

activity amongst travellers and explorers in all parts of the world, I cannot doubt that such a work might be undertaken with advantage. It is in vain to wait till all these surveys are completed, or all the different countries on the face of the earth are explored; geography, from its very nature, is, and must ever be, an imperfect, because a progressive, science; and the reasons for not undertaking such a work at present would be equally strong ten or twenty years hence. If a Geographical Dictionary were commenced at once, with a determination on the part of the editor to go to the best sources for his information, to adopt, and strictly to adhere to, one standard for the orthography of Arabic and other oriental names, and to endeavour to make his work a record of the present state of geographical, not statistical knowledge (as is too generally the case), there can be little doubt that it would be successful; and I should hope that the Geographical Society would not refuse to extend to it their countenance and patronage.

The great topographical map of France advances with a rapidity and regularity, which are highly creditable to the Department of the Dépôt de la Guerre, under whose orders it is executed. Sixty sheets of this national work have already been presented to our library through the liberality of General Pelet, to whom we are also indebted for the six volumes of the "Memorial," which describes all the *data* in detail, on which that survey is based. This last year has also brought to a close four folio volumes of the *Pilote Français*, a magnificent work, comprising charts of the whole of the northern and western coasts of France, and plans of the various ports on a large scale. Such works as these reflect the highest honour on a nation; and France may justly boast of that useful body of officers, the *Ingénieurs Géographes*, who, headed by MM. Beautemps Beaupré and Daussy, have raised a lasting monument of their zeal. A copy of this work has also been presented to our library by the liberality of the Director of the Dépôt de la Marine.

It will, I am sure, be gratifying to you to learn that the Austrian government are about to follow up the growing practice of forming societies for the improvement of geography, upon a very large scale; but it will be more intimately connected with the government, and will have much more extensive administrative functions, than the nature of our institutions would admit of. To this Geographical Institute, which will be placed under the direction of General Campana, aided by Colonel Skribaneck, are to be assigned the construction of maps, from trigonometrical surveys throughout the empire, and the whole of the topographical duties of the quarter-master general's department.

This department has already made great progress in publishing, amongst others, a map, in thirty-six sheets, of the provinces of Styria and

Illyria, which will be on the scale of half a mile to an inch, or 1-144,000 of nature.

The survey of Moravia is proceeding on the same scale, and the Austrian government are also engaged in mapping the kingdom of Lombardy and Venice, as well as the duchy of Modena.

Nor must I omit to mention a map of the kingdom of Wurtemberg, in fifty-seven sheets, on the scale of 1-50,000, or 1·3 of an inch to a geographic mile, which appears to unite great accuracy in detail with clearness and beauty in execution; for the donation of the twenty-seven published sheets of this map, our thanks are due to the Director of the Dépôt Topographique at Stuttgardt.

We are also indebted to Colonel Visconti for nine sheets of the beautiful map of Naples and its environs engraved under his directions. And, besides the topographical descriptions in progress in the various States of Italy, some of which I have just alluded to, we learn that a Corso di Geografia, by Signor Marmocchi, has lately been published, of which our zealous honorary member, Count Gråberg af Hemsö, gives a very favourable account. To this latter gentleman we are indebted for the fac-simile of a rare and curious Portulano of the middle ages, bearing the date of 1315, and now in the library of San Lorenzo at Florence. M. de Gråberg has also procured for the British Museum, among other portulani, one of Gracioso Benincasa, bearing the date of 1467. And, while on this subject, I may remark, that in the Egerton collection of MSS. in the Museum is also a valuable portulano, containing charts of not less than fourteen of the more noted map-makers of the middle ages.

M. Daussy still continues his useful *Additions* to his Table of Geographical Positions; but on this subject I must particularly direct your attention to some papers by Lieutenant Raper, R.N., now in course of publication in a very useful periodical, the "Nautical Magazine," in which that officer proposes to examine the *data*, on which the longitudes of the principal maritime points depend. These papers are divided into five sections, containing, I. An abstract of the principal scientific voyages and surveys from which our *data* are obtained. II. Remarks on the different modes of determining longitude. III. On the necessity of adopting *secondary meridians*. IV. On the propriety of adhering to one uniform method of placing on record chronometric determinations, that they may be immediately available for the construction or examination of charts. V. A discussion of the principal maritime points, extending to upwards of 200 positions, which are either the best determined, or the most general points of departure for ships. Such is a brief outline of the arduous task undertaken by Lieutenant Raper; and the present

advanced state of hydrography imperiously demands such an examination of these points, to prevent our tables of positions from falling into utter confusion; will it be credited, that we have not less than six different positions, on apparently good authority, for the well-known place, Rio de Janeiro, in Brazil?—We sincerely hope Mr. Raper will carefully and honestly sift the evidence on which these longitudes rest, assured that a more acceptable service could not be rendered to geography in general, and especially to that branch of it which is more particularly our care, as an essentially commercial and maritime nation.

Asia.—The expired year has not been barren in its supply of new materials for the geography of the continent of Asia. One of the greatest importance, and which has already received its place in your Transactions, is the very valuable Narrative of Major Rawlinson, containing the details of his Journey from Zohab, at the foot of Mount Zagros, along the Mountains to Khuzistan (Susiana), and from thence again through the province of Luristan to Kermanshah. Few men have embarked in the pursuit of geographical knowledge better qualified, under the circumstances, than this distinguished officer. Enjoying the confidence of the prince to whose service he was attached, perfect master of the language of the country, well versed in its history, having been three years a resident on its frontier, and commanding a body of troops commissioned to visit some of the provinces of the Persian empire, Major Rawlinson, in this very important and luminous paper, has ably brought to bear, in illustration of the country he visited, the Sacred Writings, the classic authors who have narrated the various campaigns of Cyrus, Alexander, Eumenes, the two Antiochi, Mithradates, Meherdates, and the Arab conquerors, and his own acquaintance with the modern historians of the East. He has explored the gates of the mountainous range of Zagros, between the basin of the Tigris and the plains of Media; he has verified the courses of the ancient Gyndes or Diyálah, and the Choaspes or Kerkhah; ascertained the site of Holwán, as he says, one of the eight primeval cities of the world, and on the high road from Baghdad to Kermanshah; he has traced the connexion of the Jews of the Samaritan Captivity with the Gurán and Iliyat tribes; collected much information on the fire-temples of Elymais; he has discovered many architectural and sculptural inscribed monuments of the Kayanian and Sassanian dynasties at Holwán, Deira, Gilán, Zarnak, Sus, and Bisutún; he has well defined the provinces of Luristán and their several divisions, and he has been the first to throw a clear light on the very difficult questions of the successive capitals of Susiana, Susán, Sus, Jundi-Shapúr, and Shuster; as also on the names and

courses of the rivers of that extensive district. The conclusions Major Rawlinson had come to on these subjects are thus stated: "I believe that in ancient times there were two cities of the name of Susán or Susa, in the province of Susiana; the more ancient, which is the Shushan of Scripture, being situated at Susán, on the Kurán or Eulæus; the other, the Susa of the Greeks, at Sus, *near*, not *on*, the Kerkhah or Choaspes. The river of Dizful I consider to be the Koprates; the Abi-zád, and its continuation the Jerábri, the Hedyphon or Hedypnus; and the united arms of the Kurán and Dizful rivers, that is, the Koprates and the Eulæus, to form the real Pasitigris."

The able arguments by which these conclusions are supported are well deserving the attention of the reader, and present a very favourable earnest of what we may expect from this enlightened traveller, [illegible] more elaborate work, in which he is engaged, on the Comparative Geography of the great Empire of Persia.

There is, however, one point in Major Rawlinson's Memoir which seems to require revision. In page 85 he accounts for no mention of the Shushan of the Scriptures, namely, that on the Eulæus or Ulai, being made by the historian of Alexander, because it did not lie upon his march from Babylon to Persepolis or to Ecbatana; and in the following page he considers that the great and rich temple in Elymais which was attacked by Antiochus Epiphanes, son of Antiochus the Great, was this Shushan of Scripture. Now it appears that the two authorities for this latter fact, which are also quoted by Major Rawlinson, are the sixth chapter of the first book of Maccabees (1—4) and the ninth chapter of the twelfth book of the Antiquities of Josephus (s. 1); and in both these authorities it is stated that Antiochus Epiphanes *was* incited to attack this city (in both places called only by the name of Elymais in Persia) by the accounts he had received of the wealth contained in it, and the coverings of gold, breastplates, and shields, suspended in its temples by Alexander of Macedon, son of Philip. We must therefore conclude, in opposition to Major Rawlinson, either that the city assaulted by Antiochus for the sake of the plunder he expected to find in it was *not* the Shushan on the Eulæus, or that this Shushan *was* conquered and occupied by Alexander. This, however, does in no way invalidate the general position of our traveller, as it is highly probable that Alexander did visit both the cities; *i. e.* the Susa near the Choaspes, on his direct route from Babylon to Persepolis, and Shushan on the Eulæus, when he took the mountain route from Susa to Persepolis, or on his subsequent march northwards from Persepolis to Ecbatana; and that his historians, as far as they are preserved

to us, have shared in the ignorance common to all subsequent writers, who have confounded the two places.

The observations of Major Rawlinson, we may also add, in passing, are not more important for the sites which he visited and described in this very interesting portion of the Persian empire, than for others, which circumstances prevented him from approaching, but the value of which, for the illustration of historical geography, he has pointed out to future explorers.

One of the most valuable additions to scientific geography which have been made during this last year, is that resulting from the survey under Lieutenants Graves and Brock, R.N., in which the latter officer has constructed a chart of the Gulf of Kos, on the south-western coast of Anatolia, accompanied by surveys of the various harbours contained in it, and sketches of the most prominent points which distinguish the approaches to them. The gulf occupies an extent of nearly 60 miles from east to west, and is [illegible] of great depth, no bottom being found in the middle of it with [illegible] than 300 fathoms of line, and even in the vicinity of the shore [illegible] seldom less than from 50 to 70 fathoms. Though so near to ports which our fleets are in the constant habit of visiting, and to the common track of the eastern trade of the Mediterranean, no chart hitherto published gives any idea of its shape or extent; and the isthmus which divides the Gulfs of Kos and Symi has hitherto been laid down, apparently, by guess. The description of this isthmus by Herodotus is very exact; it is about half a mile broad, and, with a little exertion, and by digging through a hill of inconsiderable height, the Triopian promontory might be converted into an island.

Lieutenant Brock has also surveyed the harbour of Búdrún, and ascertained the site of the celebrated mausoleum of Halicarnassus. The site and massive ruins of the ancient city of Keramus have likewise been explored.

I beg also to repeat the thanks of the Society to Mr. Charles Fellows, who has communicated to the public, at one of our meetings, an outline of the journey, which he made in Asia Minor in the spring of last year. The details of this journey derive a peculiar interest from its having been performed in a northerly and southerly direction, thus crossing upon the lines of those of Keppel, Arundel, and W. Hamilton. Between Selge and Antaliyah, upon the south coast, Mr. Fellows followed in part the track of an ancient Greek or Roman road, paved with large irregularly-shaped stones, and retaining in many places the marks worn by the wheels of chariots. This precipitous road conducted him along the banks of the Catarrhactes, almost all the waters of which were

lost, before they could reach the sea, in a porous substance formed, he says, of a conglomerate of pebbles and of a mass of encrusted vegetable matter. Mr. Fellows found ruins, to which he attributes the names of Isionda, Penedelissus, and Sylleum, the last with a theatre quite perfect, and with remains of paint upon the masks and ornaments, and also on the walls of the proscenium. The palm-tree he found indigenous at Phenika, on the coast of Lycia; and the valley of the Xanthus, with the extensive ruins of the city of that name, and of Tlos, also on its banks, he describes as sufficient to reward the artist, antiquary, or naturalist, for a journey simply to visit them.

Colonel Cohen, an intelligent traveller from Boston in the United States, has been kind enough to communicate to the Society the itinerary of his route through Asia Minor in the year 1833 (a part of which, as far as the ancient Iconium, he performed in company with a body of the Egyptian army), from Adana, south of the pass in the Taurus called the Cilician Gates, to Smyrna, and thence, by way of Kutayeh and Nicomedia, to Constantinople.

We are also indebted to Lord Pollington for a new itinerary from Erzrúm, by Músh, Diyár-bekr, and Birehjík, to Aleppo, a journey which he performed during the last summer.

With these and other aids already announced to you, we may hope shortly to possess a good map of this interesting portion of the Asiatic continent. Much, however, still remains to be done even in this comparatively accessible region.

The facilities which have been afforded by steam-navigation in the Mediterranean, and the readiness and security, with which the political state of the eastern coasts of that sea enables travellers to explore the interior, have of late years much increased our knowledge of Syria, and particularly of the deserts which border that remarkable country to the east and south; and we have good reason to expect that in a very few years, or perhaps sooner, we shall be able to construct a useful map of the great sandy and mountainous district, which extends from Egypt northward to the Holy Land, and from the sea-coast eastward to the hills of Idumæa. The travels of Lord Lindsay, M. de Bertou, and those of Dr. Robinson, Theological Professor at New York, and the Rev. E. Smith, an American missionary at Beirút, in addition to those of Laborde, Linant, and others, have already cleared up many difficulties regarding this singular district, teeming as it does with memorials of great historical interest, from the Exodus of the Israelites to the later periods of the Roman Empire; and we have at length a satisfactory solution of the problem, whether the waters of the Dead Sea could ever have flowed into the Gulf of 'Akabah. M. de Bertou

has shown that there is an elevated range of land, not volcanic, which forms the termination of the valley called El Ghor; this division of the waters flowing north to the Dead Sea, and south to the Ælanitic Gulf, lies between these two seas, about two-thirds of the distance from the former.

The exact level of the surface of the Dead Sea is a point of increasing interest not yet satisfactorily cleared up. Mr. Moore, by thermometric observations, has estimated it at about 500 feet *below* the level of the Mediterranean; Professor Schubert, by barometric observations, at 600 feet; whilst Mr. Russegger, an Austrian naturalist, has, also from barometric observations, recently stated it to be at a depression of no less than 1400 feet below the Mediterranean; but we trust that this point will not long remain a stumbling-block for geographers, as I am happy to acquaint you that more than a month since your Secretary, not unmindful of the interest attached to what appears to be one of the most remarkable features in the physical geography of the globe, placed an excellent barometer, made by Newman, and compared with the Royal Society's standard, in the hands of two young Englishmen about to visit Palestine, with a special request that they would endeavour to settle the point in question.

Dr. Robinson, in his track from 'Akabah to Hebron, ascended the western mountains to the height of 1500 feet, and followed the ancient Roman road nearly north. On this route he found and visited the ruins of the ancient Roman cities Eboda and Elusa, as well as the ruins and wells of Beersheba, still called Bír Sebá, at the distance of 28 miles W.S.W. of Hebron. On another journey, from Jerusalem to Gaza, by the direct ancient route, Dr. Robinson relates that he succeeded in discovering, amongst other places mentioned by Jerome and Eusebius, the site of the long-lost Eleutheropolis at Beït Jibrín, formerly Betogabris, where are the remains of a very strong Roman fortress and traces of an extensive city.

Professor Berghaus, of Berlin, is engaged in constructing a map of Palestine chiefly from materials furnished by these travellers.

Our knowledge of the peninsula of Arabia, and of some of the adjacent territories, has also received considerable additions during the last year. We are indebted to Mr. C. J. Cruttenden, of the Indian navy, for the narrative of an interesting journey which he made (during the time that one of the Company's vessels was surveying the roadstead of Mokhá), along the arid plains of Tehameh, and across the Jebel Barra to San'á, by what is called the Tarík-esh-Sham, or northern route, in the summer of 1836. This memoir, short as it is, furnishes us with a very pleasing picture of a part of Arabia, in which the generally steril

nature of the soil is contrasted with the luxuriant productions of the more mountainous districts; and there is every probability that the possession of the port of 'Aden, lately ceded to our arms, will materially tend to increase our intercourse with a people, who only require to be more known, and to be introduced into commerce with the Europeans, to be better appreciated. This journey has also furnished us with some additional specimens of the Himyaritic language, which in the earlier ages was spread over these parts of Arabia Felix. The united labours of Professor Gesenius, Mr. Fresnel, and of Dr. Lepsius, will, it is hoped, soon give a clear insight into the construction of this hitherto unknown tongue; and we may perhaps obtain, from the inscriptions which have been brought home, a clue to the previous history of the country. The lamented Dr. Hulton and Mr. Cruttenden also discovered, when at 'Aden, that the remarkable structure, which had hitherto been called a Roman road, is in fact the aqueduct of Soleïman the Magnificent, extending in a general north-west direction upwards of 8 miles into the interior. It is built of red brick and stone, about 4 ft. 6 in. wide, the enclosed watercourse measuring 19 in. by 16 in.; there are no remains of arches, the ground not requiring them; and its general appearance is that of a mound about 5 feet high, and bricked over.

The abridgment of the Memoir of Captain Haines, also of the Indian navy, which accompanied his chart of the south coast of Arabia, is a highly valuable paper, and contains most useful information on a line of coast extending through 7 degrees of longitude, from the Straits of Bab-el-Mandeb to the Palinurus shoal, and which is becoming every day an object of increasing interest to our traders. This memoir was communicated to the Society by the Court of Directors of the East India Company, and you have acknowledged it as an additional proof to the many you have already witnessed of the spirit of liberality and confidence, with which that distinguished body have uniformly met all the overtures we have made to them upon subjects connected with the pursuits of this Institution.

On the coast of the Hejáz we are indebted to Mr. Thomson D'Abbadie for the very useful addition of many names of places not inserted in the published charts of the Red Sea, which this traveller obtained in a coasting voyage from Jiddah to Ras Widán (a distance of about 250 miles) during the past year. Mr. D'Abbadie, from whom we have heard, within these walls, a very animated description of his stay at Musawwa', and of his journey thence to Góndar, has expressed his intention of shortly returning to that country, to pursue his researches into the interior, and to make himself better acquainted with the Amarña language.

The first fruits of the expedition into Kurdistan, under the direction of Mr. Ainsworth and Mr. Rasam, will appear in the Part of our Journal now published. The expedition, on leaving Constantinople, was obliged by circumstances to take the land route along the coast of Asia Minor, from Nicomedia; and to this we are indebted for a great mass of important information respecting the modern and historical geography of the ancient kingdoms of Bithynia and Paphlagonia, as well as of part of Galatia, and as far as Angora. The former part of this route may be said to be entirely new to modern investigation, and the Society will be much gratified by the proofs Mr. Ainsworth's notes will furnish to them, of the zeal and intelligence with which he has illustrated the courses of the rivers known under the names of Hypius, Lycus, Parthenius, and the greater and lesser Halys; as well as the mountain-ranges of the Bithynian Olympus and the Olgassys of Paphlagonia; which preceding geographers, having to draw their conclusions from ancient historians and contradictory modern authorities, had left in almost inextricable confusion. Mr. Ainsworth's notices, indeed, have laid open the resources of a country rich in mineral and vegetable productions, where iron and copper-mines only wait to be worked anew, forests to be felled, and rich plains to be cultivated, in order to furnish again the materials of a wealthy and flourishing empire. The sites of many ancient cities are ascertained, and during the journey no opportunity has been lost of fixing astronomically the most remarkable positions on the route.

Our knowledge of the geography of these parts of Asia is continually receiving valuable accessions from the proceedings of the Euphrates Expedition. Although the main purpose for which this expedition was fitted out has not yet been accomplished, the obstructions which it has encountered are rather of a political than of a geographical character, and the delay may be attributed to incidental circumstances, which must ever modify speculations of this description. In the mean time, beyond the brilliant results with which we are proud to connect the name of Chesney, and the full details of which we are daily expecting from the pen of that accomplished officer, we owe to it more accurate surveys of the two great rivers of Mesopotamia, and particularly of late that of the Tigris, nearly from its source to Samarra, and thence to Baghdad, under the directions of Lieutenant Lynch, of the Indian navy. The sites of Opis and Samarra (where, after the death of Julian in his contest with Sapor, the Roman army, under Jovian, crossed this river) have been ascertained; and the Median wall, which is still crumbling in the Desert, reaching from the ancient ruins of Sipara, on the Euphrates, to the Tigris opposite to Jebbara, has been traced by

the same indefatigable officer, who, I should also add, has succeeded in carrying his steam-boat through the Saglawíyah Canal, between the Tigris and the Euphrates. Another valuable result of the Euphrates Expedition has been the publication of Mr. Ainsworth's Observations on the Alluvial Plains of Mesopotamia.

Dr. Prichard, so well known for his "Researches into the Physical History of Mankind," has enriched some of the last pages of our Journal with a subject which, though not strictly geographical, is yet of the highest importance in illustrating the great question of the early migrations of mankind, the ethnography of High Asia. Dr. Prichard has proved, from the most recent researches, that there is no reason to suppose that the great nomadic nations of the Tartar race, the Nogays, the Kirghises, Turkomans, and Jakutes, were ever, like the purely Osmanli Turks, a portion of the true Caucasian race; he has given to us much curious information respecting the origin of the Turkish nation, and he has shown what new lights may be thrown upon this subject generally, by a comparison of the language of the Turkish, Mongolian, and Hungarian races. The principle known by the denomination of the Quadruple Harmony of Vowels is a very remarkable point of coincidence, which is shared by the Hungarian language in common with the Turkish, Mongolian, and Mandshú, whilst it is totally at variance with the euphony of the classic languages of the west. And we may observe in the former languages the marked contrast which exists between the great simplicity of the formation and inflexions of their words, and the complicated construction of their sentences.

The pursuit of this study by the disciples of Klaproth, Remusat, and W. Humboldt, has already, independent of characteristics of physiognomy, established the fact of several great divisions of the inhabitants of our globe. Such are the Scythian, Tartar, or Mogul race, that which is in possession of the language called Indo-Teutonic, or Indo-European, the races which have spoken, from time immemorial, the Semitic languages, the vast tribes of the continent of Africa, to say nothing of the languages of the Chinese, the Polynesians, and the Aborigines of the New World.

In connexion with this subject I cannot omit to mention the work of Mr. Du Ponceau, the venerable president of the American Philosophical Society, on Chinese Writing; to which is annexed Father Morrone's Cochinchinese Vocabulary, the first, we believe, of that language that has been published. The Geographical Society of Paris have also just published the account of the Moguls or Tartars, by Frà del Pian di Carpini, who, in the years 1245, 6, and 7, was the pope's nuncio in Tartary. This first complete edition of Carpini's narrative is preceded

by an excellent introductory dissertation by M. D'Avezac, on all the ancient travels into the country of the Moguls.

Carrying our view still farther to the north and north-eastern parts of the old continent, Professor Adolph Erman, of Berlin, has lately communicated to us a map of Kamchatka, constructed from his own observations during his well-known journey across Northern Asia, and round the world, in 1828–30; from which it appears that, in some parts of that remarkable peninsula, more than one-half of the extent usually laid down on our maps must be erased. Mr. Erman has also sent us a detailed account of the geology of the peninsula, and promises that we shall soon have the personal narrative of his travels in it; the account of which, I need hardly add, is eagerly looked for by all who have read his two first very interesting and instructive volumes.

The Delta of the Indus has for the first time been made known to the European world by the survey of Lieut. Carless, of the Indian navy, comprehending the main stream of the river known by the name of Wanyání, and the two principal mouths, the Hadjámári and the K'hedívárí. These have been trigonometrically laid down, from the sea as far as Titíyah, a distance of 35 miles. The shifting nature of the embouchure of the Indus, and the frequent changes made in its channel by the falling of its banks, have rendered this survey of very great importance; and the prospect which is opening to us of an increasing navigation of this magnificent, and, in its lower part, intricate stream, bids fair for a rapid improvement of our knowledge of the whole river itself, as well as of the extended basin which it waters. The labours of Mr. Carless will thus form a memorable and useful corollary to the adventurous and successful expedition of Burnes.

The military operations now carrying on in this part of the East cannot fail to enlarge our knowledge of its geography; and it is confidently anticipated that the result will be a very extensive development of our commerce and general intercourse with the Sindes, Seiks, and Affghans.

These events have indeed, in the first instance, served to bring into prominent relief our ignorance of the geography, not only of Asia generally, but even of those parts which immediately adjoin our own frontiers; and they have added another to the many proofs already adduced of the necessity of making ourselves thoroughly acquainted with the topography and resources of a country, if we wish either to administer the internal government justly, or to be ready to resist external aggression without an enormous expenditure of life and treasure.

Our authorities in the East appear also to partake of the general activity; and we learn, from the Report of the zealous and indefatigable

Secretary of the Bombay Geographical Society, that Sir A. Burnes had despatched the officers attached to his mission in various directions to collect information. Lieutenant Lynch had visited Candahar; Dr. Lord has been at Khundûz; and Lieutenant Wood has succeeded in reaching the source of the Oxus, which is stated to be from a sheet of water at an elevation of about 15,600 feet above the level of the sea. Having returned in safety to Khundûz, Mr. Wood had again started to examine the fords of the Oxus, within the territories of Murad Beg. The details of this expedition to a country, which had not been trodden by any European foot since the time of Marco Polo, must prove of high geographical interest; and I may be permitted to express a wish that they will be made public as soon as the services on which the officers are employed will allow it.

Of the trigonometrical survey of India the sheets of the map containing Rajahmandri and Cochin have been published during the past year; the drawing of the Concan also has reached England, and will doubtless soon be made public.

Portions of this survey of India present instances of accuracy which are highly gratifying, one of which I may notice, connected as it is with some of the most important maritime points on the western coast of that peninsula. Lieutenant Shortreed's survey, which connects with the great series diverging westward from the Beder base, at Chorakullee and Sawurgaon, depends upon a base measured with an excellent chain by Troughton; the triangulation extends over a large tract to the eastward, southward, and westward; and in several lines and points falls in with the trigonometrical survey of the western coast by Major Jervis, depending upon a distinct base-line of 31,003 feet (10,334·3 yards) near Cushina, measured with iron rods 20 feet in length, by that officer and Captain Robinson, of the Indian Navy; the approximation of the results proceeding from two such distinct sources is surprisingly great, so much so that I cannot deny myself the gratification of quoting the following points from the official register of these operations:—

	Shortreed. Feet.	Δ	Jervis. Feet.	Δ	Diff. Inches.
Bhoja to Mera	71,859·62	82	71,858·2	43	1¼
,, to Sookhilee	54,612·67	89	54,607·5	41	5
Sookhilee to Dhunvee	99,833·89	92	99,832·[illegible]	38	1
Dhunvee to Salira	[illegible],253·37	92	58,241·54	6	12
Mera to Karunja	99,819·25	85	99,834·5	55	14¼
,, to Lighthouse	143,723·75	87	143,742·5	66	18
,, to Sookhilee	68,420·95	88	68,409·4	181	11¼

Taking into consideration the nature of the country in which this work has been carried on, it must be admitted that the comparison of these results is highly satisfactory, as in two instances they agree within 12 and 18 *inches* respectively, in distances of 14 and 18 *miles*: thus affording a gratifying proof of the attention of the officers who

conduct the detail of the survey, and the correctness of the processes employed by them.

By a communication from Colonel Everest, the Surveyor-General, in November last, he announces the satisfactory completion of the operations, both celestial and terrestrial, of the great meridional arc north of Seronj. The care and exactness with which these operations have been performed may be understood from the fact that the Seronj base, as computed, differed from actual measurement with the compensation bars, in a chain of triangles 460 miles in extent, only *seven inches and one half.*

In conducting a work of this nature, or indeed any scientific undertaking, it is manifest that either it should be done with the utmost accuracy, and the directing officer be invested with the fullest power to ensure such accuracy, or it had better be wholly abandoned. In this department of scientific investigation there are so many nice points to be taken into consideration, so many local difficulties to contend with, which no one but the responsible officer can appreciate or enter into, that the interference of any second opinion, and especially of those who from the nature of the work cannot be presumed to be capable of forming a judgment on the subject, is calculated to slacken every effort, and dishearten, perhaps, the most zealous and enthusiastic.

A retrospect of the differences of opinion between the late Major Rennell and Colonel Lambton, as related in Herbert's Life of the latter officer, and the evil consequences resulting from them, have suggested these remarks; but we may hope that such times have passed, and that the same princely liberality, which has provided funds for effecting the great survey in India, will be henceforth extended to the mode and execution of the work; that the undertaking may throughout be executed in a manner corresponding to the advanced state of science in Europe, and on a par with the execution of the great meridional arc already measured from one extremity to the other of Hindostan; and that we may see the Atlas of India worthy to take its place by the side of the Ordnance maps of England and Ireland, or the Government Surveys of France, Saxony, Austria, and Wurtemberg, and thus become a lasting monument to the munificence and enlightened spirit of the Directors of the East India Company.

The eastern frontiers of British India have been explored and described by Captain R. B. Pemberton, of the Indian Army. These frontiers comprise the great mountain-chain between Manipur and Arracan, the territories of Manipur, Assam, and Arracan, together with Poong, Kachar, Jontiyah, and the Kossiyah Hills; the growing importance of these districts to our national and commercial interests, is the best en-

couragement to go on as we have begun, in thus preparing the way for the progress of European influence and cultivation, by a correct knowledge of the geographical features of a country.

Lieutenants Powell and Ethersey, I.N., have also completed the survey of the Gulf of Manar, preparatory to the establishment of a navigable channel between that gulf and the Bay of Bengal, by the Pámbám passage: this latter work proceeds satisfactorily under the superintendence of Colonel Monteith of the Madras Engineers.

Amongst the maritime surveys recently executed by the officers of the Indian Navy, I must also mention the examination of part of the Chagos Archipelago, and the Saya de Malha Bank, by Captain Moresby, an account of which, together with the original and beautiful charts, and a valuable portfolio of drawings, have been communicated to the Society. It is to this officer also that we are indebted for the survey of the northern half of the Red Sea from Suez to Jiddah, and for the completion of the southern half of that sea, left unfinished by Captain Elwon: Captain Moresby has also surveyed the Laccadive Islands in 1828, and the Maldive Islands in 1834. A part of the Chagos Archipelago, named Owen's Bank, still remains to be examined, as well as about 90 miles of the N.W. portion of the Saya de Malha, and a great extent of unexplored space among the Seychelles Islands. During the last ten years Captain Moresby has surveyed upwards of 5000 miles of coast; and, if we except Captain Daniel Ross, I.N., the actual President of the Geographical Society of Bombay, few officers of the Indian Navy have rendered more essential service towards the advancement of Geography in the East.

But I have dwelt, perhaps, at too great length on the conquests of geographical science within the continent of Asia. It is, however, this part of the world which offers to the geographical inquirer more objects of high importance, considered in an historical or ethnological point of view, without taking into our consideration the more immediate but momentary interests of politics and commerce, than all the rest of the globe put together. At the same time we may strictly characterise the progress of science to which we have alluded rather in the light of recoveries than of discoveries. A long lapse of years of darkness and barbarous inroads erased from the map of the world, known to the civilised portion of mankind, immense tracts of country, once the seat of arts, learning, and triumphant dominion: we are now slowly restoring to science single parts of that lost map, and thus repairing the injuries done by our forefathers, and reconstructing in more indelible characters, we may confidently hope, the edifice which they pulled down. We reconstruct, too, in the spirit of peace and philanthropy,

what the earlier dynasties erected as the monuments of sanguinary conquest, and what fell by hands armed with ruder swords, and guided by a worse spirit.

The history of the human mind, and the development of the intellect, under the various phases in which man has borne his part, as a ruler or as a subject, are, after all, as much the real and legitimate object of these inquiries as the appropriation of the knowledge we at the time acquire, to the immediate benefit of the present generation, and of those which are to come after us: for they directly tend to improve our hearts and our minds, to place before us, in the most prominent light, the superior advantages of peace over war, of rational authority over brute force, of liberty over slavery; and, whilst they should make us thankful for the benefits we enjoy from a more advanced state of civilisation, from a purer religion, and from a clearer stock of ideas in the range of the practical and the intellectual sciences, they are a perpetual warning to us that the possession of the most extended power is not in itself an earnest of its durability; that knowledge, without an enduring struggle to increase it, is no security against ignorance; that civilisation, unless based upon justice, may be overwhelmed by barbarism; that temples built upon a rock may crumble to dust; and that empires upon which the sun never sat may be forgotten.

Africa.—Africa still offers the same barrier to the progress of discovery, and it is feared will continue to do so, unless some systematic and well-considered plan for penetrating into the interior be devised and steadily acted upon. The recent labours of Captain Vidal, R.N., in the Bight of Benin, and on the Ashanti coast of Western Africa, and those of Lieutenant Carless, I.N., from Rás Hassún northwards to Ras Jerdassún (Cape Guardafui), and thence westward to Ras Gulwaini and Berbera, on the eastern coast, all but complete the correct outline of this great continent; but, within this coast-line, strict geographical investigation has not made very great advances during the past year.

In Northern Africa the French government have carried a triangulation over the territory of Algiers including Bonah, Kostantinah, and Storah, whence the longitude of the Kasbah of Kostantinah appears to be 6° 37′ E. of Greenwich, differing only 7 miles of longitude from the position of that place, determined by our learned countryman Shaw in 1726.

In Marocco we find, from the rough note-book of the lamented Davidson, that, following the steps of the British mission to that country in 1830, related in the 1st Vol. of the Geographical Journal, he proceeded from the city of Marocco across the plain in a S.S.E. direction into Atlas, as far as the ruined town of Tasremút, at an elevation of 3000 feet above the sea; thence turning to the westward he continued

along the valleys of Atlas by a route not laid down in any of our maps, and which we are enabled partially to trace only in that of M. de Grâberg; passing within a few miles of the site of Aghmát Warikah, he appears to have issued from the mountains beyond a place called Amishmish, perhaps Imizmizi of our maps, and then to have crossed the plain to Mogador. Geographers cannot but feel grateful to Mr. Thomas Davidson, the traveller's brother, for allowing his rough notes of this novel route to be made public.

The Council of the Society have, in the course of the last year, appropriated the sum of 50*l.* from the funds of the Society towards a project, formed by a society of gentlemen interested in Egyptian and Æthiopian discovery, for sending out a native of Dongolah to explore the course and sources of the Bahr al Abyad, or the western and principal affluent of the Nile.

Explorations in the interior of Africa have been almost from their first commencement towards the middle of the last century, the exclusive inheritance of British ardour and enterprise, for Hornemann and Burckhardt we have long been accustomed to identify with our own countrymen; and the circumstance of the African Association having been fused into this Society, has given to this noble feature in the history of inland discoveries an additional value in our eyes. It was therefore with much gratification that we witnessed within these walls the discussions, in which Mr. Macqueen took an active part, upon the subject of the basin of the Chadda and its contributory or departing waters—that is, whether it be still water, or have an outlet. Major Denham had maintained the former hypothesis, and it is clear from his description and his own personal experience that the Shari does not flow out of it; but Captain W. Allen, who is so well known to you as the navigator of the Quorra, and of the Chadda as far as Fandah, and who has given much attention to this portion of African geography, is strongly of opinion that the Yeou River, mentioned by Denham as a clear, deep, and rapid stream of sweet water, communicating with the lake, and traced by Clapperton as far as Zangeia, 300 miles from the lake, and supposed to be the same with that which Lander crossed and recrossed on his return from Zaria to Danrorah, must either be identical with, or one of the principal affluents of, the Chadda, which passes by Jakóba and discharges itself into the Quorra a little below Fandah. From these data Captain Allen draws the natural conclusion that the Chadda, a larger river than the Quorra, is the outlet of the Lake Chad, drains the lofty Komri or mountains of the moon, and thus affords an uninterrupted water-communication perhaps to the very centre of the African continent.

Turning to the north-western coast, M. D'Avezac has published a critical analysis of one of the earlier journeys of the late Réné Caillié among the Moors of Beraknah, near the banks of the Senegal, for the details of which I refer you to the *Bulletin* of the Geographical Society of Paris; and in the same publication is to be found an interesting biography, by M. Jomard, of a man who, born with a true spirit for geographical discovery, if he had had the advantages of a more cultivated education, would have been entitled to a very distinguished place amongst the travellers of our days; though his journey to Tumbúktú, owing to the misfortunes which awaited him, has added but little to our knowledge of that part of this continent.

Dr. Edward Rüppell, of Frankfort-on-the-Main, is well known to you as one of the most distinguished travellers and naturalists of the present day. A few years ago we had the pleasure of seeing him at one of our meetings, when he gave us some valuable information respecting the interior of Africa. Dr. Rüppell has twice successfully explored the interior of that continent, and of the peninsula of Arabia. His former works need not on the present occasion be alluded to further than to say, that the Council had them also in their mind, when they awarded to him one of the royal medals at their disposal for the past year. Of his second journey Dr. Rüppell has hitherto given to the public the result in part of his geographical discoveries.[c] These comprise a full view of the political and administrative state of Egypt under Mehemet Ali, seen by the eyes of a judicious and inquiring traveller, various notices on the productions of Lower Egypt, an excursion into Arabia Petræa, a journey from Cairo to Jiddah, and thence to Musawwa', the Island of Dahlak, and the ruins at Zula. Making Musawwa' his head-quarters, he visited Halai and Ategout in Abyssinia; from thence he gained the banks of the Tacazzi, near the village of Ber Agow. His route then lay through the province of Semen, and other parts of the region watered or rather penetrated by the Tacazzi, and the two great affluents of the Nile, the White and Blue Rivers. Besides the great mass of statistical and zoological information, the result of Dr. Rüppell's travels, they still owe their highest value to the great number of astronomical observations, by which he has fixed the latitudes and longitudes of every remarkable spot which he visited. These observations have long formed one of the most valuable divisions of the "Correspondance Astronomique," published at Genoa by the Baron Von Zach, to whose instructions Dr. Rüppell was chiefly indebted for his proficiency in the science, which he cultivated with such ardour and success throughout his African travels.

Dr. Rüppell's explorations in Kordofan have been followed up by

Mr. A. Holroyd, who has given us, very lately, the notes of his journey in the year 1837, from Wadi Halfah, at the second cataract of the Nile, to the ruins of Musawwerát, in the neighbourhood of Shendi, and to Khartúm, the station of the Pasha's government for the provinces S. of that cataract. Khartúm is situated upon the W. bank of the Blue River, about 1½ mile above its junction with the Bahr el Abyad, in 15° 34′ 40″ N. lat.; and, though but a small village a few years ago, has since risen rapidly into importance at the expense of Shendi and Sennár.

Mr. Holroyd observed in more than one place, in crossing the desert, many siliceous fossil trees, the superficial stratum of the ground being a coarse sandstone. Some of these trees were 51 feet in length, and 20 inches in diameter; and partially buried in the sand: splinters of them are used as fire-flints. They were apparently doom-trees, or the Thebaic palm-tree.

At Sennár, Mr. Holroyd describes the banks of the Blue River as between 40 and 50 feet high, the rise of the river being about 20 feet. Returning from Sennár to Wádí Medinah, he crossed from the Blue River at that point to Monkarah on the White River, a journey of 86 miles; and he gives a most favourable account of the capability of the ground for fertility, and for irrigation by canals, by which cotton, indigo, tobacco, sugar, and grain might be cultivated with success.

From Kajebi, where the thermometer was at 112° on the 19th March, Mr. Holroyd proceeded into Kordofan by the desert of Habsháheh. He found El Obeïd, the capital of Kordofan, with a population of 30,000 inhabitants, having doubled in the last ten years. Here we have another instance of the improvements likely to accrue to geographical knowledge from the progress of conquest, even in the hands of a power only in a comparatively advanced state of civilisation. The influence of the Pasha of Egypt has made countries now of easy access, which a few years ago were shut out from all but the traveller in disguise; and though the necessaries of life are so cheap, that their ordinary currency consisted of pieces of iron forged from the ore obtained in the neighbourhood at Wad Dha-s-Sákiyah, English gold had also its current value in the Bazár.

Mr. Holroyd returned from El Obeïd to Monkarah, on the White River, by the desert of Sakrah, a distance of 170 miles, and he decidedly prefers this route, as more abounding in villages, and better supplied with water, to that by Habsháheh. He has described the appearance and effect of two hurricanes of the desert, when the air was thickly charged with sand for two or three days; the thermometer at 102° and 104°. The hurricanes lasted about two hours.

Besides the services rendered to geography by Mr. Holroyd, I cannot

omit making mention of one which he has rendered to humanity. He was instrumental in obtaining from the Pasha of Egypt a promise that he would put an end to one of the practices attendant upon the state of slavery, so long the curse of these unfortunate countries. In the dearth of other means of paying his troops, that chieftain had been in the habit of giving to them, in lieu of arrears of pay, one or more of the unfortunate beings whom the fortune of war, or what was still worse, predatory incursions, had thrown into his hands. Owing to Mr. Holroyd's intercession we have reason to hope that this new feature in the history of the horrors of the slave trade has been abandoned.

Dr. Bowring has also, within a few days, communicated to the Society the Journal of Mohammed 'Ali, dictated by himself, of his expedition from Cairo to Fazoglo during the past winter.

AMERICA.—I have said that the attainments, which geography is perpetually making in Asia, are rather to be described as recoveries than as discoveries. The latter term applies, on the contrary, in its fullest extent to all which we are doing in the New World; and I am happy to be able on this occasion to signalise as a triumph, wholly of this description, the expedition to the north coast of America, undertaken, at a great pecuniary sacrifice, by that high-spirited body, the Hudson's Bay Company. Messrs. Simpson and Dease have passed a second summer in carrying on their meritorious surveys of that portion of the continent; and we have been recently gratified with the announcement that the same gentlemen, after ascending Dease's River in the month of June last year, and crossing the portage between that and the Coppermine River in boats carried along the ice with a fair wind and hauling-ropes, descended the last-named river to the mouth, which they reached on the 1st of July. Here they were imprisoned in the ice till the 17th, whence, after encountering the greatest difficulties, they at length succeeded in reaching in their boats Point Turnagain, after making a circuit of 140 miles by Arctic Sound and Barry's Islands.

On the 9th of August they had attained a point 3 miles to the southward of Franklin's Furthest in 1821. The season was so much more unfavourable than on that occasion, that no hope was now left to them of making any further way by sea. The boats were therefore sent back on the 20th of August, and Mr. Simpson, with a small party, proceeded on foot, prepared for a limited journey of ten days. In this interval they reached on the 25th of August a point on the coast, on which they erected a pillar, in lat. 68°.43′ N., 106° 3′ W. long., and where the magnetic variation was 60° E. The compass had grown sluggish and uncertain in its movements as they advanced eastward, and frequently had to be shaken before it would traverse at all.

A long range of high lands had been seen out at sea to the N., capped with snow, which they called Victoria Land; and an archipelago of islands within 100 miles of coast were thus traced; and with what they could clearly descry to the E., when they were obliged to return, about 120 miles of continental discovery were effected. A large open sea was also seen to the eastward, from the farthest point reached; but there were no means of ascertaining whether it might extend to Ross's Pillar or to the estuary of Back's Great Fish River, though the trending of the most distant land in view rather seemed to favour the latter supposition.

There can be no doubt that these successful results of the first attempts of the Hudson's Bay Company to connect scientific pursuits with those in which they are more immediately concerned, will encourage them to persevere in the same honourable course; and it is only necessary to observe that they will add greatly to the services which they have already rendered to the cause of science, if they will avail themselves of any opportunities which may occur to instruct their servants in the arctic regions, and more particularly in the neighbourhood of Hudson's Bay, in reference to the statement made by Captain Sabine in his "Report on the Variations of Magnetic Intensity in different Parts of the World," to observe with the greatest care the intensity of the needle in those parts, the maximum of which Captain Sabine imagines will be found nearer to Hudson's Bay than to New York, at which latter place the highest force hitherto recorded in the northern hemisphere, namely 1·8, is stated to have been observed.

Dr. Richardson, the companion of Sir John Franklin in his Arctic journeys, has recently communicated to the Society a valuable paper, containing the discussion of all Sir Edward Parry's thermometric observations while in these regions, between the years 1826-8; and on this subject I must notice that, in accordance with the suggestion of Professor Baer, of St. Petersburg, the council of this Society has, through the kind assistance of the Hudson's Bay Company, caused twenty well-graduated thermometers to be distributed throughout their territory, in the hope of obtaining a series of observations, which may enable us to determine the curve of equal temperature throughout that extensive region.

A Society like ours, instituted for the purpose of promoting, mainly, physical geography, cannot have seen, without much gratification, that Her Majesty's government have decided upon an Antarctic voyage of magnetic research; and Captain James Ross, so well known as having borne his part in all the Arctic voyages since 1817, has been appointed to the command of an expedition, the main object of which is to establish in the island of St. Helena, at the Cape of Good Hope, and in Van Diemen's Land, sufficient stations for making regular hourly observations of the fluctuation of the three elements of variation, dip, and in-

tensity, or their equivalents, with magnometers on the most approved construction, during a period of three years. The geographer cannot be insensible to the importance of accurately ascertaining the minutest properties of an instrument, namely, the compass, on which all his admeasurements so immediately depend. And it may not be out of place to remind you that nearly three years ago public attention was first called to the subject of an Antarctic expedition in a printed letter addressed to Sir John Barrow, then our president, and was more recently brought forward at the meeting of the British Association, by one who has proved himself not the least zealous of the Members of the Geographical Society; you will at once perceive that I allude to your Secretary, Captain Washington; and I am happy that this occasion has been afforded me, of declaring to you that the Royal Geographical Society owes a large share of its fame and success during the last two years to his indefatigable industry, to the extensive correspondence which he carries on with all the most intelligent geographers on the continent of Europe, to the suggestions which he offers to travellers for their guidance on their departure, and his readiness to assist in making the best use of their information on their return, to the courtesy with which he receives all who come to our rooms, and to the admirable manner in which, in conjunction with our learned Foreign Secretary, Mr. Renouard, he arranges the documents which are transmitted to us, and conducts the publication of them through the press. I am sure you will all warmly respond to the feelings which have dictated this very inadequate expression of the conviction of your departing President.

You will hail with much satisfaction the promised appearance of a work by Admiral Wrangel, on the Russian possessions in North America. In the capital of these countries, New Archangel, where is a population of nearly 10,000 persons, the Russian American Trading Company have already founded a library, schools, hospitals for the sick, churches, and chapels; an observatory is shortly to be erected, as well as a cabinet of natural history for the productions of the colony; and magnetic observations have been taken in an appropriate building, since 1833, in pursuance of the desire expressed to that effect by the Imperial Academy of St. Petersburg. The author observes that the inhabitants have as yet little, if anything, in common with other European settlements in America; they ought rather to be compared with the Danish settlements on the west coast of Greenland. The climate and soil are so little congenial to agriculture or pasturage, that the entire occupation of the colonists is confined to fishery, as was the case with the original inhabitants previous to the arrival of the Russians.

We are indebted to our zealous corresponding member, Mr. Worcester, of Cambridge, Massachusetts, for a table of corrected positions

of places in the United States, many of them fixed by his own observations; and I may, perhaps, be permitted to express our regret that we cannot hear any account of the progress of the national survey of that vast territory, which we understood had been confided to the able direction of Mr. Hassler more than three years ago.

Passing to the southern division of this great continent, I have the satisfaction of announcing the publication of the Narrative of the surveying voyages of her Majesty's ships Adventure and Beagle, during the examination of the coasts of Patagonia, Chile, and Peru, within the years 1826 and 1836. As an abstract of these voyages, giving all the most important positions determined, and the chief practical results obtained, has been printed in our Journal, and I had occasion so recently from this chair, when presenting our gold medal for the year 1837 to the commander of this expedition, to state my opinion, and I believe I may add that of most geographers, of the value of these results, I need now only express my conviction, that henceforth the names of HUMBOLDT and FITZROY must be inseparably connected, as the chief authorities for our knowledge of the Geography of South America.

Of the four volumes now lying on your table, and for which we are indebted to Captain FitzRoy, the first contains the journals of Captain P. P. King, who began the survey of these shores in 1826, and prosecuted it for four years; the second and the fourth relate entirely to the voyage of the Beagle under command of Captain FitzRoy, during the continuation of the survey and circumnavigation of the globe, between the years 1831 and 1836; the third, written by Mr. Charles Darwin, is devoted to natural history, every branch of which, during this expedition, appears to have been explored by this distinguished naturalist.

When we consider the immense mass of materials contained in these volumes, the detailed tables of positions (which, though unheeded by the common reader, are invaluable to the geographer), the great extent of coast minutely examined and described; and, independently of the various official duties, as revising charts, writing sailing directions, &c., that the whole account has been given to the public in its present complete, and I may add, beautiful form, within little more than two years since the return of the Beagle to England, I am sure that I do but express the opinion of the greater part of this Society and of geographers in general, in saying that the 'Voyages of the Adventure and Beagle during the examination of the shores of Patagonia, Chile, and Peru,' have not their parallel in the annals of maritime surveying.

In addition to the numerous illustrations contained in this work, there is a general map of South America, of which I cannot deny my-

self the pleasure of saying a few words, were it only as a mere act of justice to Mr. John Arrowsmith, who has bestowed upon it a great portion of the labour of the last two years. Besides embodying the whole of the Survey, by Captains King and FitzRoy, of the coasts from the river Plata round to Guayaquil, reduced from the original charts, this map is corrected from the following documents; parts of Columbia, and the course of the Orinoco, from Baron Humboldt; the coast of Brazil from the survey of Admiral Roussin; Venezuela, from a large Spanish unpublished map; the Amazons, from observations by Lieut Smyth, R.N.; British Guayana, from the recent researches of Mr. Schomburgk; New Granada, from MSS. collected by mining companies; Equador, from a MS. sent home by General Miller, and received by him from the government of that State; Peru, from maps received also from General Miller and Colonel Belford Wilson, both of which officers have greatly exerted themselves to collect these materials; Bolivia, from Mr. Pentland's original observations, including the survey of the shores of the lake of Titicaca, and from some MS. maps received from him. The provinces of Chiquito, Moxos, and Cochabamba, with the Affluents of the Madeira, from a MS. brought home by Sir Woodbine Parish; Chile, from a MS. map of Dalbé, procured by Captain FitzRoy; the provinces of La Plata, chiefly from Sir Woodbine Parish's materials, for a detailed account of which, I may refer you to the introductory chapter of his recently published and excellent work on that country, in which he had profited by the opportunity afforded him as Chargé d'Affaires, to collect all the geographical documents that could be obtained, many, indeed, of the highest value.

The province of Rioja has been corrected from the map of Mr. French, which, with its accompanying memoir, has been presented to the Society: the direct route from Cordova to Mendoza is laid down from Captain Gosselman, of the Swedish navy; the northern frontier of the interior of Brazil, from original tracings furnished by Mr. Mornay; and the southern part, from St. Catherine's to the Banda Oriental and the Rio de la Plata, as also, Paraguay, from original MSS. brought to England by Sir W. Parish.

Upwards of 100 MS. maps, besides other written information, have been worked up with judicious criticism by Mr. Arrowsmith, in the construction of these two maps of South America and the provinces of La Plata; and they may safely be pronounced to give by far the best delineation yet produced of these countries, or likely to be expected for many years to come. To the work on the Provinces of La Plata I have already alluded, but I cannot refrain from recommending all who take an interest in the geography, the commercial prosperity, or the future

prospects of those republics, to read carefully the faithful account of them here offered by an impartial and accurate observer.

Of some of the upper regions of the Andes we have received very interesting information from the distinguished geographer and naturalist, Mr. J. B. Pentland, Her Majesty's Consul-general at La Paz, then the capital of Bolivia. Near to the Guallillas Pass, in crossing the western Cordilleras, at an elevation of 14,700 feet, Mr. Pentland examined the gigantic undertaking of some Englishmen, by which the whole stream of the Uchusuma, now flowing in a contrary direction, will be made to enter into a canal formed for the purpose, at about 14,000 feet above the level of the sea, the extent of the canal being 40,000 yards, before it reaches the culminating point of the Andes, over which it is to pass, on its way into the valley of Tacna, for the purposes of irrigating an extent of territory on the western slope, to which nothing has been denied by nature but a competent supply of water.

In the neighbourhood of Cuzco Mr. Pentland found vast remains of ancient structures of Cyclopean masonry, raised by the industry and and skill of the Peruvians; he visited and fixed the positions of some of those extraordinary natural phænomena of the country, where large rivers cut through the Andes, particularly where the Yucay passes from the basin of Ollantay-tambo and Urubamba, into that of Santa Ana, and where the Mapuri breaks the chain of the eastern Cordillera at the N.W. foot of the Nevado of Lachisani, a part of the gigantic mass of Ancuma. Mr. Pentland has also determined by astronomical observation the position of nearly 40 points, and, by barometrical means, their elevation above the sea, comprising every important feature of the eastern Cordillera between the parallels of 16 degrees and 13 degrees of south latitude. He has also, with the assistance of Mr. Bowring, the real author of the map lately published at Paris, completed the survey of the great Lake of Titicaca, where, at the height of 11,000 feet, the extensive ruins of the ancient Peruvians, especially of sepulchral monuments, indicate the former existence of a very dense and active population.

You have already heard, in the Report of the Council read to you this morning by your Secretary, that Mr. Schomburgk has now nearly completed the fourth year of his explorations into British Guayana and its contiguous provinces; the reports of his ascent of the river Essequibo, Berbice, and Corentyn, with some notices on the basins which they water, have already appeared in the sixth and seventh volumes of the Journal. During the two last seasons which he has spent in the interior of that country, during which he has frequently experienced the benefits of the continued courtesy and assistance of

the present governor, Colonel Light, as he did before from the lamented Sir J. Carmichael Smyth, he has explored the source of the Essequibo, which he reached on the 27th Dec., 1837, in lat. 0° 41′ N., and long. 59½° W. He then crossed the Equator, and penetrated to 0° 12′ south lat. Returning thence to Pirará, he crossed the Brazilian frontier to Fort San Joaquim, where he experienced the greatest civility and assistance from the Brazilian commandant; he then descended about 30 miles of the Rio Branco, and explored the range of the Carumá mountains, on its eastern bank. Returning again to Pirará, Mr. S. has travelled in a N.W. direction through the valleys of the Paracaraima range, to the sources of the river Caruni, and to the remarkable lofty table-topped sandstone mountains of Rorima; and at the date of his last letter, Nov. 20th, 1838, he was about to proceed westward to the head waters of the Orinoco, with the intention of descending the river to Esmeralda, thence to cross over the range of mountains, which separates the basins of the Orinoco and the Amazons, descend the Padaviri, to the latter stream at Thomar; thence ascend again the Rio Branco, and thus by Pirará return to Demarara. Mr. Schomburgk and all his party had suffered much from fever and climate; but his zeal in the cause of discovery appears unabated; and should he reach the coast safely, with his historical and other collections, there is little doubt that in addition to his geographical information, he will bring with him a rich harvest in several departments of natural history.

AUSTRALIA.—Colonization, and in good part geography, continue to make rapid strides in the great island of Australia. In New South Wales we have the account of three expeditions into the interior by Sir Thomas Mitchell, illustrated by beautiful sketches of the country and portraits of the natives. At Port Phillip, the town of Melbourne has already 3000 inhabitants; and an accurate survey of this fine bay has been completed by Lieutenants Symonds and Henry, R.N., and published at the Hydrographic Office.

At Adelaide, St. Vincent's Gulf, it is said that 10,000 persons are already settled in a colony, which only sprung into existence a few years ago. Several overland expeditions, driving large herds of cattle, have reached this place from Sydney; amongst others that of Captain Sturt himself, the original explorer of the River Murray, and another by Mr. Hawdon, the details of whose route have been communicated to the Society.

On the north coast of Australia a settlement named Victoria has been formed at Port Essington, which, from its very convenient site, and its immediate neighbourhood to a large but little known archipelago, bids fair to become a second Sincapore. Farther to the west the nautical

survey by Captain Wickham has completed some of the portions left unfinished during the more extended examination of these coasts in the years 1820–3 by Captain P. P. King, R.N., and the account of which is still the chief authority for this portion of its shores, as the excellent work of Flinders is for the rest of this vast island. The survey of the Beagle has proved Dampier's Land, or Dampieria, not to be an island, by tracing Roebuck Bay and King's Sound to their termination, the latter affording an outlet to the largest river yet discovered on this part of the coast, and which, in honour of the late commander of the Beagle during her survey of the coasts of South America, has been named FitzRoy River.

Captain Wickham has since been employed in surveying the approaches to Swan River and Rottenest Island: and Sir James Stirling has just brought home a plan of Warnborough Sound, lying immediately to the southward of Cape Peron, which if the entrance be not obstructed by some hitherto unknown rocks, will afford one of the finest harbours on the western coast of Australia.

On the north-west coast, Lieutenants Grey and Lushington are the first Europeans who have ever penetrated into the interior. Starting from Hanover Bay on the 1st February, 1838, they proceeded in a general S.S.E. direction. At about 20 miles they came on the bank of a considerable river, which they named Glenelg, flowing through a fertile tract of country: continuing on in the same direction, they had great difficulty in getting their cattle over the sandstone hills; and when at a distance of 71 miles from the coast, want of pasture obliged them to return. By the latest accounts from Lieutenant Grey, dated Swan River, 22nd December last, we learn that during the three months he had passed there, he had made several short excursions into the interior, as far as any colonist had yet penetrated: he had lived much among the natives, studying their manners and customs; and had collected a vocabulary of their language, which he has just communicated to the Society. Whatever may be the result of this officer's explorations, we cannot but admire the zeal, activity, and perseverance, which appear to have animated him on all occasions, even under circumstances of no common trial.

I must not omit on this occasion also to mention that Mr. John Arrowsmith has lately published a general map of Australia, besides separate maps of South East Australia, the settlements at Adelaide and Port Phillip, and Western Australia, including all the recent discoveries.

Public attention has lately been much directed to New Zealand, and we hope that Captain Symonds, who has just sailed for that country, well supplied with instruments furnished by the Society, will obtain for us some useful geographical information.

Considerable expectations had been entertained that the voyage of discovery in the Antarctic Seas, undertaken by the French government, and under the command of Captain Durville, would have added to our knowledge of these inhospitable regions, and in which it is still hoped that a large field may yet be opened for scientific and commercial enterprise. The very unusual severity of the season during the South Polar summer of 1837-8, prevented Captain Durville from penetrating further south than the 64th degree of latitude. The same seas which had enabled Captain Weddell in 1822-4 to reach ten degrees nearer to the South Pole, presented to Captain Durville a compact and impenetrable barrier of ice; but the attempt to proceed southwards was not abandoned, until the ships had fruitlessly struggled during a whole month against the obstacles of nature.

The observations which I have ventured in the preceding pages to submit to your notice on the progress of geography, imperfect as they are, would perhaps by some be thought to be still more so, if I were to omit altogether, however familiar the subject is to us all, to allude to the great and rapid strides, which have been made within a very recent period, for the extension of steam navigation. This mighty power, which is spreading its influence over all the seas of Europe, and many of the waters of the other parts of the world, to the annihilation, we might almost say, of space and time, conveys the traveller as it does the merchant or the soldier, from one continent to another, with so many facilities as to make the communication between the most distant regions as safe and easy, and almost as rapid, as it formerly was between remote districts of the same empire. This has essentially contributed to make us better acquainted with each spot. The voyage to North America is by this mode of conveyance reduced from six weeks to about a fortnight, that to India from four to two months, and that to the farthest shores of the Black Sea is almost for the first time since the middle ages opened to the flag and commerce of Western Europe. The coasts of the Baltic may be visited from our own ports within the space of a short week: with a slight interval of overland conveyance, we may reach Constantinople with the same facilities by the Rhine and Danube.

The Indus, the Euphrates, the Tigris, the Ganges, and the Mississippi, are penetrated by the same means almost to their sources, with the same certainty, and thrice the rapidity, which have hitherto been experienced on the most ordinary canal for inland communication; and, we may confidently hope, that at no great distance of time the great rivers of South America, and even those of China, may be subjected to the same dominion of science and enterprise. In the mean time we have reason to apprehend that we may shortly be brought into rapid and regular communication with the coasts of Chile and Peru, by the

establishment of steam-ships from our own shores to the Bay of Chagres, and from Panama to Valparaiso; for which we shall be principally in-debted to the exertions of Mr. Scarlett, Mr. Wheelwright, and their fellow-labourers in this noble project.

Another remarkable isthmus, that of Suez, will also, in all probability, for the same or similar purposes, become again what it once was, the highway of nations; and the possessors of Egypt may again see themselves holding the key to lock or to unlock the most direct line of communication for the exchange of the commodities of the East and West.

And not only may we anticipate from the success of this undertaking large additions to our geographical knowledge of these distant portions of the world, but we may justly expect that such an instrument of intercourse between man and man will be the signal for rousing the intellectual energies which have long lain dormant in the two great continents of South America, and of the long-benighted Asia. This Asia, in which man has hitherto been almost always in a state of infancy, the infancy either of youth, or of premature and decrepid age, we hope to see at length throw off the chains, which have in all times held her whole social system in a state of unnatural servitude, checking the wholesome developement of the best faculties of our race by institutions hostile to all improvement, and to which the inhabitants are the more strongly attached, in proportion as they are more destructive of the means by which their happiness and their comforts might be increased. But the great engine to which I have alluded must inevitably teach them that there are other worlds besides their own, that the banks of the Ganges and of the Indus are not the only spots on the globe, on which Nature has been lavish of her choicest productions, that there are other enjoyments than those of listless indolence, and the observance of the idle or superstitious practices of their fathers; that they, as well as the other creatures of a benevolent Creator, are born inheritors of a cultivable mind, that they are not debarred from partaking with Europeans of the charms and advantage of Science; that the opportunity is now offered them of bearing an active part in shedding the blessings of civilization over the whole world, that they in short may, and must in due time, become navigators, astronomers, mechanicians, philosophers, geologists, and geographers.

If I were asked, what I conceive to have been the one mainspring, to which modern times owe their immense advantages in Science generally, I put out of the question any comparison between the two ages of the world in respect to literature, or to eloquence, or to moral and intellectual philosophy, poetry, or the fine arts; but speaking strictly of Science, to what one faculty, or rather tendency, of the human

mind, are we most indebted for our superiority over the ancients? I should say, it was the spirit of geographical and nautical discovery, which developed itself in the middle of the fifteenth century. This spirit, which guided Diaz, in 1486, to double the Cape of Good Hope, and Vasco di Gama to penetrate to India, Columbus to discover the New World, Magellan, Drake, Schouten and Le Maire to find their way into the Pacific, has forced every succeeding generation to cultivate astronomy, navigation, chemistry, metallurgy, botany, and every science which could contribute to dive into the depths of the elements of our own globe, and of those which govern the great phænomena of the system of which we form a part. Nature herself has here presented larger and more varied laboratories, in which these phænomena, and all her various monuments may be studied. Without this accession to our knowledge, without this enlargement of the sphere of our observations and experience, without this excitement to improve the machinery of our minds, we should probably have long remained immured in the darkness, in which our ancestors groped their way in the pursuit of knowledge; we should have lived on the ill-digested remnants which the antients had left us; we might have guessed, but might never have been convinced of the form of our globe; we should have been satisfied with hugging the coast in our most distant voyages; marine architecture would not have advanced beyond a galley or a trireme; our eyes would not have been opened to the splendid natural productions of a tropical climate; the precious metals would have become so scarce in Europe, that capital would have been unknown, commercial adventure would have slept its long sleep, distant colonization could not have been dreamed of, and there would have been no escape from domestic tyranny, from religious persecution; no opening for daring adventure. But the spirit of discovery was the happy spell which changed the destiny of nations; and Europe is not insensible or blind to the advantages she has derived from it. New societies are annually springing up in the principal cities, to promote and encourage it; each forming, as it were, a nucleus for the reception and promulgation of the results of the observations of travellers and navigators. We rejoice in the increasing number of our fellow-labourers in this rich and inexhaustible field. The contest we are engaged in is one in which all are proud of their success, all are sure to win: we play into each other's hands, we are all partners, and all rivals; the stake we contend for partakes of the infinite divisibility of nature, with this difference in our favour, that the greater the number of divisions, the larger is the portion which each of the parties may appropriate to himself.

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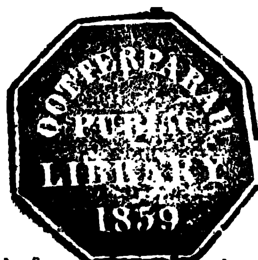
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PAPERS READ

BEFORE THE

ROYAL GEOGRAPHICAL SOCIETY.

I.—*On the Stade, as a Linear Measure.* By W. MARTIN LEAKE, Esq. Read 26th November, 1838.

§ 1. SOME modern geographers have supposed that the ancients, in computations of distance, employed stades of different lengths, varying in the number contained in a degree of latitude from 500 to 750.* By means of this variety, they have endeavoured to reconcile the conflicting statements of the ancient mathematicians as to the measure of the perimeter of the globe, as well as to explain the disagreements which, on the supposition of an uniform stade, continually occur in applying ancient distances to true measurements on a globe or map. An attentive examination, however, of all the evidence which may be derived on this question from ancient authors or extant monuments, justifies the opinion that the stade, as a linear measure, had but one standard, namely, the length of the foot-race, or interval between the *ἀφετηρία* and *καμπτήρ* in all the stadia of Greece, and which is very clearly defined as having consisted of 600 Greek feet.†

* D'Anville, Mesures Itinéraires, vi. p. 69.—Gosselin, Géographie des Grecs Analysée.—Recherches sur la Géographie Systématique et Positive des Anciens.—Géographie de Strabon, i., Observations Préliminaires, v. p. 501.—Romé de l'Isle, Métrologie; Paris, 4to, 1789.—Freret, Mém. de l'Acad. des Inscr. xiv., 1ère partie, p. 160; xxiv. p. 432, 548.—D'Anville, *ib.*, xxvi. p. 82. 92; xxviii. p. 346; xxxi. p. 292.—Delabarre, *ib.*, xiv., 1ère partie, p. 512; xix. p. 533, 517, 562.—De la Nauze, *ib.*, xxvi. p. 101; xxviii. p. 362; xxxvi. p. 86.—Gibert, *ib.*, xxviii. p. 212.—Jomard, Mém. sur le Système Métrique des Anciens Egyptiens. Description de l'Egypte, vii. p. 8.——In France, the hypothesis was not without opponents, as Montucla, Hist. de Math. i. p. 241. In Germany, Ukert on the Geography of the Greeks and Romans, i. sec. 3, may be particularly referred to.

† *Αἱ δ' ἑκατὸν ὀργυιαὶ δίκαιαί εἰσι στάδιον ἑξάπλεθρον, ἑξαπέδου μὲν τῆς ὀργυιῆς μετρεομένης καὶ τετραπήχεος· τῶν ποδῶν μὲν τετραπαλαίστων ἐόντων, τοῦ δὲ πήχεος ἑξαπαλαίστου.* Herodot. 2, 149.——See also Strabo, p. 322.—J. Poll. iii.—Suid. in Μίλιον, Πλέθρον, Στάδιον.—Phot. Lex. in Πλέθρον Στάδιον.—Eustath. in Il. II. 240.

Herodotus has mixed the Greek measures with the Egyptian, and has added to them the parasang: whence it would seem that the inhabitants of Lower Egypt, where many Greeks were then settled, had in his time borrowed the stade and its subdivisions from the Greeks, and that the parasang had been adopted during their subjection to the Persians. The only proper Egyptian measures, with which we are acquainted, are the schœnus of 24,000 cubits and the cubit divided into 28 digits.

The Attic foot, taken from the stylobate of the Parthenon, was equal to 12·1375 English inches :* the length of the stade, therefore, in English measure, was 606·875 feet. The stade was generally considered equal to one-eighth of the Roman mile,† or 625 Roman feet.‡ the mile having been 5000 of those feet. The Roman foot, taken from extant Roman monuments, was 11·6 English inches; § deduced from the Greek foot of the Parthenon, in the proportion of 625 to 600, or 25 to 24, it was 11·652 inches. By the former proportion, the Roman mile was equal to 4833 English feet, or 22 feet less than 8 stades: thus perfectly agreeing with Plutarch, who informs us that the mile was something less than 8 stades.|| And hence it seems evident that the Greek stade contained something more than 625 Roman feet. Indeed, when it is considered that the stade was a measure foreign to the Romans, and was composed of a foot different from theirs in length, there was little chance of its having been an exact fraction of a mile, though the accidental proximity was probably the origin of the furlong or eighth, as a division of the mile.

Results so nearly coinciding, though drawn from monuments and authorities, between the dates of which there was an interval of six centuries, tend strongly to show the accuracy, permanence, and uniformity of Greek measures—of which we have a parallel

* Stuart's Ant. of Athens, ii. p. 35. Ed. Kinnaird.

† Λογιζομένω δὲ ὡς μὲν οἱ πολλοὶ τὸ μίλιον ὀκτωστάδιον. Strabo, p. 322.—Polyb. 3, 39.—Dionys. Hal. iii.—Appian, .—Vitruv. 1. 6.—Columel. 5, 1.—Plin. H. N. 2, 63 (108).—Frontin. de Expos. form. ap. rei agr. Script., Goes. p. 30.—See also an Anonymus in the collection of Goes.—Marcian, Heracl. ap. Geogr. Gr. Min., Hudson. Livy constantly converts the stades of Polybius into miles at this rate. Compare Polyb. 3, 42; Liv. 21. 28—Polyb. 3. 101; Liv. 25. 9—Polyb. 14, 4; Liv. 30, 5—Polyb. 14, 8—Liv. 30, 8. Strabo, in testifying that eight stades were equal to a Roman mile, asserts that Polybius added two plethra, or a third of a stade (Πολύβιος, προστιθεὶς τῷ ὀκτωσταδίῳ δίπλεθρον, ὅ ἐστι τρίτον σταδίου, p. 322); but this is contrary to the testimony of Polybius himself, who describes a great road through Spain and France as divided into miles of eight stades each (ταῦτα μὲν βεβημάτισται καὶ σεσημείωται κατὰ σταδίους ὀκτὼ διὰ Ῥωμαίων ἐπιμελῶς, 3, 39). Strabo, therefore, seems to have understood Polybius, who perhaps meant only to say that a Roman stade, or measure of 600 Roman feet, would require 8⅓ of them to the mile; for 8⅓ to 8, or 25 to 24, is exactly the proportion of the Greek foot to the Roman, as given by Pliny.

‡ Stadium centum viginti quinque nostros efficit passus, hoc est, pedes sexcentos viginti quinque. Plin. H. N. 2, 21 (23).

§ Folkes (in the Philosophical Transactions, anno 1736) concluded $\frac{966}{1000}$ of the English feet, or 11·592 inches, to have been the length of the Roman foot.—Raper, Phil. Trans. 1760) 11·64 in the time of Titus, and 11·58 in that of Alexander Severus. The average of these, 11·6 does not differ a fiftieth part of an inch from th[illegible] of numerous measurements made by the French. See Gosselin, Géogr. de Strabon, i. p. xxi.—Ukert, 1. sec. 2.

|| τὸ δὲ μίλιον ὀκτὼ σταδίων ὀλίγον ἀποδεῖ. Plutarch, C. Grac. 7. Caius Gracchus caused mile-stones to be erected on the great roads of Italy, as well as other stones at short intervals on each side of the road, that horsemen might mount their horses without the assistance which had before been necessary (ἀναβολέως μὴ δεομένοις.)

instance in the Attic weights, particularly as exemplified in ten or twelve denominations of silver money, of which the standard continued to be correctly preserved during at least seven centuries. An accurate standard of the foot was obviously not less necessary to the Greeks than that of the drachma; or rather it was a natural consequence of the perfection, to which they attained in architecture and other arts, founded on metrical principles. For the standard of the stade as a measure of distance the stadium of every large city furnished a constant and easy reference, and thus tended to keep the measure accurate and uniform: for there can be little doubt that whatever difference there may have been in the construction of stadia as places of assembly, the length of the foot-race—that contest which gave immortality to the victor, and for which competitors were periodically collected from every country of Greek origin, at Olympia, the Isthmus, Nemea, and Delphi, as long as the four sacred games continued—was invariably the same throughout Greece.* This indeed is strongly confirmed by many stadia still extant in Greece; and hence undoubtedly arose, in the progress of Greek civilisation, the general use, as a linear measure, of this multiple of the natural measures taken from the human body, which were the earliest in all countries. As the stade could not have been introduced into common use as a measure, until long after the establishment of the sacred games, we are not surprised to find, even so late as the time of Herodotus, traces of the earlier custom of describing distances in the ὀργυιὰ, or fathom, the longest of the Greek measures before the stade was introduced.

These observations refer chiefly to European Hellas. We have no information as to the gymnastic and agonistic customs of the Greek cities of Asia prior to the Roman, or at least to the Macedonian conquest—or even whether there were at an earlier time any stadia in the Asiatic Greek cities for those purposes, which had such a powerful influence on the manners and character of the people of European Greece. To this side of the Ægæan, at least, the great games which maintained the integrity of the European Greek stade were confined, until, on the other side, Persia had yielded to Macedonia.

The only clear indication which ancient history affords of a difference of standard between the Asiatic and European Greek foot is found in Herodotus, who remarks that the Egyptian cubit

* It requires better evidence than the tale related by Aulus Gellius (l. 1.) on the pretended authorities of Plutarch and Pythagoras, and which seems to have been invented in illustration of the proverb, 'ex pede Herculem,' to prove that the Olympic stadium was really larger than the others; for, had the foot of Hercules been only one inch longer than that of other men, it would have made a difference of 50 feet in the curriculum of the stadium.

was equal to the Samian.* Now the average of four Memphite cubits found in Egypt, and very slightly differing, is $20\frac{6}{10}$ English inches.† The Samian foot, therefore, was $13\frac{3}{4}$ English inches; and a stade composed of this foot would be 687 English feet in length. Herodotus remarks that the royal cubit of Assyria was three digits, or one-eighth, greater than the πῆχυς μέτριος,‡ or ordinary cubit of a Greek foot and a half, and equal consequently to 20·482 English inches, differing very slightly from the Memphite cubit. A stade composed of 400 of these cubits would have been 683 English feet. Heron of Alexandria, a writer of the fifth century of our era, who has supplied us with a table of Greek measures of his own time, together with others which he calls ancient, places among the latter the Philetærian stade, formed of 600 Philetærian or royal feet, which bore to the Italian the proportion of 18 to 15.§ The name Philetærian tends to the belief that this foot was in use at Pergamus; which, having been the most illustrious and powerful city in Asia for two or three centuries after it had become the capital of a kingdom,‖ may have brought into use in the surrounding part of Asia a foot of a particular standard, together with its multiples. If so, the Pergamenian was somewhat longer than the Samian foot, and its stade was 697 English feet. Whether these proportions are exact or not, we may at least conclude that the foot or cubit of Egypt and Asia was longer by about a tenth than that of European Greece; and hence it is possible that, under the Macedonian monarchies of Egypt and Asia, a stade bearing about that proportion to the stade of Greece may have been employed in those countries. There is some reason to believe that this was really the case in Asia Minor, as stadia still exist in that country, as at Aphrodisias and Laodiceia, of which it is difficult to conceive that the curriculum was not considerably longer than in the stadia of Greece Proper. These, however, are the utmost variety of stades, for which any support can be found in ancient history prior to the third century of the Christian era; and one only of these, besides the European Greek stade—namely, the Samian—can be supposed to have been in use before the time of Alexander the Great. Taking the French measurement of the perimeter of

* Herodot. 2, 168.

† Jomard, Lettre à Remusat sur une nouvelle mesure de coudée; 4to. Paris, 1807.

‡ Herodot. 1, 178.

§ Montfaucon, Palæog. Græc. p. 365.—Mém. de l'Acad. des Sciences, vii. p. 2 3. 3to.

‖ 'Longè clarissimum Asiæ Pergamum;' the acquisition of which, says Pliny, more affected the manners of Rome than that of any other Greek city, as the Pergamenians were equally renowned for their libraries and their cock-fighting. 'In the time of Pliny Pergamus was the centre of an extensive jurisdiction.—Plin. H. N. 10, 21 (25).

the globe, upon which the length of their metre was founded, and which gives 364,538 English feet to the degree, the stade of 600 Greek feet was a little more than the 600th part of a degree, the Babylonian was the 534th, the Samian the 530th, and the Pergamenian the 523rd.

The hypothesis, however, of the celebrated French geographers referred to at the beginning of this Paper, requires a much greater variety of stades, and it requires stades which in one instance only, that of 600, bear the same proportion to the degree as any of those above mentioned. D'Anville annexed to the Map of his Ancient Atlas the scales of four different stades: the Aristotelian of about 1110 to the degree;—a stade of 60 to the Egyptian schœnus, differing not greatly from the former;—the Olympic of 8 to the Roman mile;—and a nautical stade of 10 to the same mile. Romé de l'Isle imagined 8, and Gosselin 9 different kinds of stade, derived from various ancient computations of the perimeter of the globe in stades; these were 400000, 360000, 300000, 270000, 252000, 240000, 225000, 216000, 180000; giving respectively to the degree of latitude the following number of stades, 1111$\frac{1}{9}$, 1000, 833$\frac{1}{3}$, 750, 700, 666$\frac{2}{3}$, 625, 600, 500.* The whole principle of this hypothesis is comprehended in the words of Jomard: "Le module diffère, l'unité est la même;"† that is to say, it was imagined that an unknown people of the highest skill in astronomy and geography had made a true measurement of the perimeter of the globe; that the Greek geographers had expressed it in stades of different lengths; that from the proportion of the several computations of the perimeter to each other, the rate of each kind of stade to the degree may be recovered; and that by the application of some one of them, many of the distances mentioned by ancient authors, which are apparently incongruous and false, may be reconciled with the truth. In this manner the ancients will undoubtedly appear to have made a much greater progress in accurate geography than can otherwise be imagined. There is strong reason to believe, however, that their conflicting estimates of the circumference of the globe had a very different origin.

§ 2. The most ancient computation of the perimeter appears to have been that of 400000 stades,‡ and to have been adopted by Thales and Anaximander. By what method this estimate was obtained we have no positive evidence; but we may presume that the ancient mathematicians alluded to by Aristotle proceeded in the same manner as Eratosthenes, by endeavouring to compare

* Gosselin, Géographie de Strabon, i. p. 1; v. p. 500.

† Mém. sur le Système Métrique des Anciens E'gyptiens. Description de l'E'gypte, vii. octavo, p. 183.

‡ Aristot. de Cœlo, 214.

the terrestrial distance between two places, situated under the same meridian, with their interval in parts of the great circle, this being in fact the only mode of connecting geometry with astronomy. The ancients had never any better means of obtaining the proportion of the arch to the whole circle, than by observing the proportion between the length of the gnomon and its shadow: but in this manner, as the instruments which they employed were rendered more perfect, differences of latitude might be ascertained with an increasing approach to accuracy. The terrestrial measurement was of greater uncertainty: indeed the difficulty which modern experience has shown to attend this simple operation, so as to render it worthy of confidence as a basis of geometrical calculation, is alone sufficient to account for all the discordant results of the ancient attempts to measure an arc of the meridian.

The method by which Eratosthenes obtained the perimeter of the globe in stades is recorded by Cleomedes.* Having assumed Syene to have been on the extreme limit of the tropical line, where the gnomon gives no shadow on the longest day, and Alexandria to be under the same meridian as Syene, at a distance of 5000 stades, Eratosthenes observed, and with a near approach to the truth, that at Alexandria the gnomon on the longest day covered one-fiftieth part of the circle. Five thousand stades, therefore, he inferred to be the fiftieth part of the circumference of the globe, and 250000 stades to be its perimeter. About 30 years later, Hipparchus is said to have augmented the computation of Eratosthenes to something less than 277000 stades, but upon what ground, Pliny, the only writer who alludes to the fact, has not informed us:† indeed it is virtually contradicted by Strabo, who informs us that Hipparchus employed the proportion of 700 stades to the 360th part of the great circle, making a perimeter of 252000 stades, and that he attempted to determine the celestial phenomena appertaining to each of these degrees.‡

In another calculation mentioned by Cleomedes, but without naming its author, the distance between Syene and Lysimachia in the Thracian Chersonesus, was assumed to be a fifteenth part of the circle, and their terrestrial distance to be 20000 stades, giving for the entire circle 300000 stades. This measurement is no otherwise deserving of attention, than as having been adopted by Archimedes,§ for the difference of latitude between the two places instead of being a fifteenth, was little more than the twenty-second part of the great circle. Another attempt to estimate the circumference of the earth was made, about a century after the time of Eratosthenes, by Posidonius, who, employing the same

* Cleomed. Meteor. 1, 10.
† Plin. H. N. 2, 108 (112).
‡ Strabo, p. 62, 131.
§ Archimed. in Arenar. p. 277.

kind of process as Eratosthenes, determined the perimeter to have been 240000 stades,* which gives a rate of 666⅔ stades to the degree; but afterwards reduced that number to three-fourths or 180000, which gives 500 stades to the degree.† The arc of the meridian employed by him was that between Rhodes and Alexandria; which places he, as well as Eratosthenes, erroneously believed to be under the same meridian, at a distance which he reckoned at first 5000 stades, but afterwards reduced to 3750, and consequently the perimeter in the same proportion, nearly of 4 to 3. This number 3750, however, Posidonius derived from Eratosthenes himself, who having obtained the difference of latitude between Alexandria and Rhodes by gnomonic observations,‡ had converted it into stades at the rate which he had obtained in Egypt from a comparison of 5000 stades with the difference of latitude between Syene and Alexandria. Both these computations of Posidonius, therefore, were nothing better than unsuccessful endeavours to improve upon Eratosthenes. In the second calculation, by diminishing his distance in stades, without correcting his difference of latitude, which instead of a fiftieth is about a sixty-eighth part of the circle, he was still farther from Eratosthenes in defect, than he had before been in excess.§

All the geographers of later date, or at least until the second century of our æra, were satisfied with the computation of Eratosthenes,|| which had the merit of proceeding on a correct assumption of the difference of latitude. Pliny speaks of it in terms which show that it still maintained its authority in his time.¶

* Ap. Cleomed. Meteor. 1. 10.

† Strab. p. 95.

‡ αὐτὸς δὲ διὰ τῶν σκιοθηρικῶν γνωμόνων ἀνευρεῖν τρισχιλίους ἑπτακοσίους πεντήκοντα. Eratosth. ap. Strabon, p. 126. Pliny also says (H. N. 5, 31 (36), Rhodos distat ab Alexandriâ Ægypti, ut Eratosthenes tradit cccclxix M.P. Which, according to the proportion invariably observed by Pliny between the stade and the mile, was 3752 stades.

§ There were other reports of the distance between Alexandria and Rhodes. Isidorus made it 578 M.P., or 4624 stades; and Marcianus 500 M.P., or 4000 stades (Plin, l. l.). Nothing can better show the uncertainty of ancient geography than such disagreements regarding one of the most important lines in the ancient maps, and which the geographers could not have failed to have agreed upon, at least within a much smaller difference, if the ancients had possessed even any such rough mode of calculating the run of a ship as the modern log. It is curious that all the ancient computations are wide of the proportion required by the stade of 600 Greek feet, or 600 stades to the degree. By this measure the true distance between Alexandria and Rhodes is about 3250 stades.

|| Strab. p. 113, 132.—Plin. H. N. 2, 108 (112).—Vitruv. 1, 6.—Macrob. Somn. Scip. 1, 20;—2, 6.—Eratosth. al. Hipparch. ad Arat. Phænom. 2, in fin. ap. Petav. Uranol. p. 144.—Gemin. Elem. Astron. 13, ap. Petav. Uranol. p. 30.—Censorin. de die nat. 13.—Martian. Capel. de Geom. 6, p. 194, Lugd. Bat., 1599.

¶ Improbum ausum, verùm ita subtili argumentatione comprehensum ut pudeat non credere, H. N. 2, 108 (112). Marcian of Heracleia, however, says (p. 64, Geogr. Gr. Min. 1., Hudson) that Eratosthenes stole it all from his predecessor Timosthenes.

It seems nevertheless to have been regarded only as an approximation; since, when the division of the circle into 360 degrees came into common use, which had already occurred in the time of Hipparchus,* 2000 stades were added to the 250000, for the sake of obtaining a rate in even numbers of 700 stades to the degree. From a similar motive some other geographer thought proper to augment the number to 259200;† by which he obtained a degree of 720 stades, or 12 stades to the minute, which he may have found a still more convenient instrument of calculation.

As the distance between Alexandria and Rhodes, computed by Eratosthenes, was nothing more than an inference from his Egyptian calculation of the perimeter, it follows that the correctness of them both, as well as the rate of 700 stades to the degree, which was deduced from that measure of the perimeter, depended almost entirely upon the truth of the 5000 stades assumed by Eratosthenes as the direct distance between Syene and Alexandria; for as to his mistaken supposition that the two places were under the same meridian, the error arising from it is scarcely to be regarded, if the distance itself be uncertain. Egypt, the reputed parent of geometry, was, above all the countries of the ancient world, that in which we may conceive the existence of maps, from which Eratosthenes may have obtained this important datum.‡ Nothing, however, in proof of such a proficiency in practical geography has yet been found among those monuments, which have given us an insight into almost every part of the customs and social life of the Egyptians; and as they show, when compared with the books of Herodotus relating to Egypt, that the information which he collected in that country was extremely imperfect, we may presume, if not that the Egyptians were never possessed of correct maps of their own country, that the Greeks at least had not been able to avail themselves of that knowledge;§ consequently

* It appears that this mode of dividing the circle was introduced among the Greeks in the time of the Ptolemies, which favours the opinion that it was Egyptian, and derived from the number of days in the ancient year of that people. (Strab. p. 81.—Diodor. 1, 50.)

† Marcian. Heracl. ap. Geogr. Min. 1, p. 6, Hudson.

‡ Strabo, p. 787. It was the opinion of Freret (Acad. des Insc. xxiv. p. 510) and Gosselin (Traduc. de Strabon, v. p. 314, note 1) that the accurate subdivision of the Egyptian soil, and the measurements repeated after every inundation, had the effect of supplying the Egyptians with the exact dimensions of their country, within a cubit. But however correctly the lands of each nome may have been measured, the combination of the whole into a correct map was almost impossible without trigonometry.

§ While our modern knowledge of Greece tends generally to justify Herodotus, the reverse occurs in regard to Egypt, and shows that he had trusted to those who were unable or unwilling to inform him correctly. An example of this comparative degree of truth in Herodotus is afforded by his remark that the distance of Heliopolis from the sea was 15 stades greater than that of Olympia from Athens, which two places were distant 1485 stades by the road (Herodot. ii. 7). The latter distance was tolerably correct in stades of 600 Greek feet; instead, however, of being equal, it

that the distances in Egypt reported by Herodotus were, like all the other long distances of the Greeks, calculated by converting the time of travelling into stades, according to an assumed rate; and that the 5000 stades of Eratosthenes was nothing more than a computation of the same kind, which, if we may be allowed to judge by the roundness of the number, had no great pretension to accuracy.

§ 3. As the ancients had no portable instrument for measuring the portions of a day, and consequently could not easily ascertain the rate of travelling by the hour, a day's journey was their most exact measure of distance, both by sea and land, even as late as the time of Ptolemy the geographer, though comparatively few distances thus reported have reached us, because ancient geographers and historians, aiming at greater precision, have converted the days into stades, and by reporting these, without mentioning the number of days, have generally given us, instead of a fact, the result of an uncertain calculation.

It was naturally in the eastern basin of the Mediterranean, and around Crete, where the naval experience of the Greeks commenced, that they first attained a knowledge of distances approaching to correctness. Homer reports that the Cretans sailed in five days to Egypt,* meaning undoubtedly a continued course with a leading wind, and not farther removed from a direct line, than may have been desirable for the purpose of making a speedy landfall on the African coast. The rate derived from this number of days is the very reasonable one of 62 geographical miles in the twenty-four hours. Five centuries afterwards, the Greeks were still so imperfectly acquainted with the coast of Sicily as to estimate its circumnavigation at eight days, instead of six and a half, which would have been the number according to the proportion furnished by the Cretan ships, or five, at which Strabo rates it in a time when it was almost as well known as it is now. This diminution of the number of computed days, on a coast or route as it became more explored, was founded in reality; for in proportion as experience overcame difficulties or apprehensions,

bore to the former in direct distance the proportion of 105 to 80, these being the respective lengths of the two lines in geographical miles. But the most remarkable instance in which Herodotus adopted from the Egyptians information obviously false, is his description of two pyramids in Lake Mœris, which he states to have been a stade in height, or 160 feet higher than the great pyramid of Ghizeh, and half covered by the waters of the lake. Strabo remarks that the Egyptian priests, whom he styles barbarians, resisted all the efforts of Plato and Eudoxus to obtain a communication of their knowledge. It may be thought, perhaps, that although denied to Eudoxus and no longer existing in the time of Strabo, it may have been accessible to the Ptolemies; but though the Greeks then derived some assistance from the astronomy of Egypt, they seem to have obtained little or nothing from their geometry.

the undertaking would be performed in a smaller number of days. But even after the computed days had been reduced to the smallest number, persons who travelled the route for the first time would often imagine that they passed over a greater distance in the day than was true; and thus arose an exaggerated rate of the day's journey, which was reduced as the seas or countries became better known, though it never, except in some rare exceptions, reached the true rate of the Greek stade of six hundred feet, or six hundred to the degree, because the Greek geographers, following the authority of Eratosthenes, had agreed in considering seven hundred as the right proportion.

Herodotus has left us the most remarkable example of an exaggerated computation of stades to the day's sail, in his description of the dimensions of the Pontus or Black Sea. The length of this sea, from the Bosphorus to the Phasis, he states to have been, in time, nine days and eight nights.* This, when measured by the Homeric rate of the Cretan ships, is in just proportion to the reality: but when Herodotus converts his summer day's sail into seven hundred stades, and his night's into six hundred,† making a total in the twenty-four hours of thirteen hundred stades, we are under the necessity of inferring, either an extreme exaggeration in the number of stades, or that by these stades he intended a measure of less than half the length of the Greek stade. It is evident, however, that his estimate of a day's or night's sail in the Pontus is nothing more than an extravagant conjecture of his own, caused probably by his exaggerated idea of the magnitude of this, which he describes as the most wonderful of all seas (πελαγέων ἁπάντων θαυμασιώτατος); for admitting, contrary to all probability, that in other parts of his work he may not always have employed the stade, which, without the smallest hint of the existence of any other, he has defined as consisting of six hundred Greek feet, it is impossible to suppose that he could in the same breath have intended two different measures, without distinguishing them. And yet this supposition would be necessary, since in the same passage in which he describes the length of the Pontus in a number of stades, giving a rate of between twelve and thirteen hundred to the degree, we find that the length and breadth of the Bosphorus and Hellespont, places intimately known to the Greeks, and which the eye could measure, are accurately stated by him in stades of six hundred Greek feet: namely, the Bosphorus as one hundred and twenty stades long and four broad (of course in the narrowest part), and the Hellespont as four hundred stades long and seven broad. It is clear, therefore, that in this instance Herodotus allowed an excessive

* Herodot. iv. 86. † Id. iv. 85.

number of stades to the day's sail on the less frequented route, and accurately estimated the measure of the known places. In like manner, the length of the Propontis, which was better known in the time of Herodotus than the Pontus, but not so well as the Bosphorus and Hellespont, he states to have been 1400 stades, which gives a rate of 840 stades to the degree, or two-thirds of that which results from his length of the Pontus, and about the medium between the latter and that of the Bosphorus. Thus also in the unexplored coasts of the Persian Gulf and Indian Ocean we may remark that the stades of Nearchus are as short as those of Herodotus in the Pontus, until he obtains a pilot, after which the day's sail gives a longer stade.*

By a similar effect we find that, in all those parts of the ancient world which were best known to the Greeks, the rate of seven hundred stades to the degree is, in general, that most applicable to their reported distances. These, however, were direct lines, reduced from itinerary computations, and we know by modern experience how generally it happens in such cases, that the diminution is insufficient: we may conclude, therefore, that in truth no other than the stade of 600 Greek feet was intended by the ancient computors. The more frequented the route, the more populous the country through which it passed, the more civilized and lettered the people, the more nearly we find the reported distance to approach that standard of the stade. Thus according to Herodotus, the road distance from Athens to Olympia was 1485 stades,† giving a rate of 13½ stades to the geographical mile, when measured with intervals of 5 geographical miles in the compasses along the course of the road. The road distance from Ephesus to Sardes, according to the same historian, was 540 stades,‡ which, when measured on the map in the same manner, gives a rate of between 11 and 12 stades to the geographical mile. But this difference of rate may be accounted for by the circuitous nature of the former route; by its having crossed several ridges of mountains, and partly perhaps because, in the time of Herodotus, it may have been less correctly known than that from Ephesus to Sardes. There can be no question, therefore, that in both instances the historian intended the same stade, which he has elsewhere defined as consisting of 600 Greek feet.

The same result is produced on a much longer line of road, that from Sardes to Susa, the road distance between these places, 13,500 stades,§ giving, when measured on the modern map along the course of the road, with intervals of half a degree in the compasses, a rate of something less than 12 stades to the geo-

* Vincent's Commerce and Navigation of the Ancients in the Indian Ocean i. p. 229.

† Herodot. ii. 7. ‡ Id. v. 54. § Id. v. 52.

graphical mile. And this may be considered as one of the most authentic road distances in the ancient world, the road having undergone a kind of measurement, for it had been divided into σταθμοι, or stations, resembling the Roman mansiones, at which buildings were erected for the convenience of travellers; it appears even that the intervals between the stations had been computed with some care, since, as we learn from Herodotus, who has entered into details regarding this road, the stations were not always at equal distances, having doubtless been fixed at longer or shorter intervals as the nature of the country required. The truth of his description is confirmed by the near approach to correctness in the proportions of the different parts of the route to the whole, when measured on the modern map, and proves, upon the whole, that in this remarkable instance the stade of 600 Greek feet was certainly intended by the historian.*

§ 4. With these considerations in view we may now examine the perimeter by Eratosthenes, and that computation of 5000 stades of direct distance between Syene and Alexandria, upon which he founded his calculation. In the absence of trigonometry this distance could only have been obtained from itinerary estimates by some rule of reduction, which was inevitably more or less liable to inaccuracy. The itinerary distances may have been computed by land or by water; the difference could not have been great on the whole length of Egypt, as the windings of the valley follow those of the river. By Herodotus the whole distance from the sea to Syene is reckoned at 7920 stades. On my own map of Egypt, the scale of which is 6 inches to the degree, the length of the river up to Syene, measured along the line of navigation, with intervals of 4 miles in the compasses, is about 600 geographical miles. The computation of Herodotus therefore gives about 800 stades to the degree. Three or four centuries later, however, when the Nile had become one of the best-known and most-frequented roads in the ancient world, Aristocreon reckoned the same distance to be no more than 6000 stades;† and his computation agrees perfectly in proportion with that of Artemidorus, who reckoned the distance from the head of the Delta to Syene to have been 4800 stades, and equal to that from Syene to Meroë, which equality is confirmed by modern observation. The numbers of Artemidorus accord also with the aggregate of distances on the route by land in the Antonine Itinerary from Heliopolis to Syene;

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* This valuable passage is defective in one place, and there is an evident loss of some words, the number of stations in the Matiene being too small, and the parasangs being entirely omitted; which renders it impossible to compare the proportions of this part of the route with the map. De la Barre has ingeniously supplied some words which would make the passage complete and consistent.—*Mém. de l'Acad. des Inscriptions*, viii. p. 341.

† Ap. Plin. H. N. 5, 9 (10).

namely, 596 M. P., equal to 4768 stades. Here, therefore, we have the clearest proof that, as the experience of the Greeks increased, the computation shortened; and at length was obtained with tolerable correctness in the true Greek stade of 600 to the degree. As Eratosthenes lived much nearer to the time of Artemidorus than to that of Herodotus, it is not improbable that his estimate of the itinerary distance from which the direct distance of 5000 was reduced may have been nearer to the correct number of Artemidorus than to the excessive valuation of Herodotus. But, however near it may have been to the former, still it is evident that there required only too high an estimate of the navigation, or too small a diminution in calculating the direct distance (and both might possibly combine), to increase the measure of the arc from 453 geographical miles, its true length on the modern map, equivalent to about 4500 stades of 600 to the degree, to the 5000 of Eratosthenes. And thus we have a strong argument that all ancient computations of distance were more or less faulty; that, with the increasing knowledge and experience of the Greeks in seas and coasts, or in routes by land and water, they more nearly approached the truth; and that neither Eratosthenes nor any other Greek geographer ever had in mind any other but the true stade of 600 Greek feet, however erroneous their computations of distance in that stade may be found on comparing them with the modern map.

When the pacification of the world under Augustus gave a degree of security to the countries forming the Roman empire, which they had never before enjoyed, the paths of commerce and social communication became more frequented, and the distances of places more correctly known. We find accordingly that all those reported in stades by the most trustworthy authorities of the first and second centuries of our era favour the belief that they intended no other than the true stade of 600 to the degree. In the Black Sea, in place of the exaggerated estimate of Herodotus, we now find that its diameter from Byzantium to Panticapæum, as well as the medium of four or five different computations of its circumference as reported by Pliny, give a rate not much greater than 600 to the degree. And if we refer to Pausanias, who, from his diligence and the nature of his pursuits, is more worthy than any other author of being consulted on this question, it will appear that, although some of his numerous distances are doubtless incorrect, either by the fault of the author or his transcribers, they are evidently in general calculated in the same stade which six centuries before his time was defined by Herodotus as consisting of 600 Greek feet, and which generally produces a rate of 10 stades to the geographical mile in short, and of 12 or 13 in long distances. Of the latter there are not many in Pausanias, but I

may refer to that from Sparta to Olympia as being one of the most likely to have been measured and well known. These two places he states to have been 660 stades distant by the road, which gives a rate to the geographical mile on the line of road of 12½ stades, the direct distance being 53 geographical miles.* Another proof that the Attic standard of the foot, and consequently of the stade, was uniform in Greece Proper and its colonies, even at a late period, is afforded by Hyginus, who informs us that the Cyrenaic foot bore to the Roman the proportion of 25 to 24,† being exactly the same as that of the Attic foot to the Roman.

If the origin and real nature of the varying calculations of the circumference of the earth were such as I have endeavoured to prove, it is obvious that the stades of different lengths deduced from them are quite visionary. It would be superfluous, therefore, to enter into any detailed exposition of the system which endeavours to reconcile ancient computations of distance with the truth, by applying to them, according to the necessity of the case, stades of 1111¼, or of 883⅓, or of 666⅔, or of 500, or any other proportion to the degree; a system which has been carried so far that the same ancient writer has been supposed to have reported the length of a country in one kind of stade, and the breadth in another. Even if such an hypothesis were well founded it would prove too much. Correctness in distances, or even in proportions of distance between the principal points of a map, the most simple and certain test of its truth, could not possibly have been attained by the ancients, unaided as they were by the compass or by observations of longitude, and possessing no means of measuring an horizontal angle. In fact, when we come to examine their geographical proficiency, we find it in exact proportion to the poverty of their geometrical means.

In the eastern portion of the Mediterranean and the countries around it, their information, as before hinted, more nearly approached the truth than in any other part of the world. Eratosthenes knew that the general direction of the valley of Egypt, when produced, would describe that of the western coast of Asia Minor:‡ he knew that Mesopotamia was shaped liked a boat,§ and he was better acquainted than we have been, until recently, with the course of the Nile through Nubia.|| By limiting the

* The two distances reported by Pliny, from Sicyon to Elis 1200 stades, and from Athens to Sparta 440, are totally inconsistent and inaccurate; as the former would require a rate of more than 10 stades to the geographical mile, the latter less than 6.

† Hyginus de limitibus constituendis, ap. rei agrariæ scriptores, Goes, p. 210.

‡ Eratosth. ap. Strabon., p. 114. § Id. ibid., p. 79, 80.

|| Id. ibid., p. 786. The remarkable bend of the Nile in Nubia here described by Eratosthenes was first verified in modern times by the information procured by Burckhardt. See his Travels in Nubia, p. 451.

οἰκουμένη or inhabited earth to about one-fourth of the northern hemisphere, the length of which was included between the Sacred Cape of Iberia (St. Vincent) and the mouth of the Ganges, and the breadth from about 12° N. of the equator to Thule, and by supposing the whole of this land to be surrounded by the Atlantic Ocean, he was enabled to anticipate Vasco da Gama in imagining the possibility of circumnavigating Africa, and Columbus in supposing that India might be reached by sailing westward from the coast of Iberia, if, as Eratosthenes adds, the great extent of the Atlantic Sea were not an obstacle.*

The degree of accuracy, however, to be attributed to his positions in general may be estimated by the points which he places in the same latitude with Rhodes, on the line which a century before his time, and much more anciently, had been assumed as the διάφραγμα τῆς οἰκουμένης or central line in the length of the world:† these points were the Sacred Promontory of Iberia, the Columns of Hercules or Straits of Gibraltar, the Sicilian Straits, Capes Tænarus and Sunium in Greece, Issus, and the Caspian Gates.‡ Of these, Sunium is 1° and the Sicilian Straits near 2° to the north of the latitude of Rhodes. On the central meridian, or that which at Rhodes cuts the diaphragma at right angles, he placed Meroë, Syene, Alexandria, Byzantium, and the Borysthenes,§ not one of which is on the same meridian as Rhodes, though Byzantium is not far from it. As well as Hipparchus he followed Pytheas in placing Massilia and Byzantium in the same latitude,|| and he imagined Carthage, the Sicilian Straits, and Rome, to have been under one and the same meridian.¶ The distance between Sicily and the Peloponnesus he made almost as great as that between Sicily and the Straits of Gibraltar;** and the breadth of Northern Greece from Dyrrhachium to Thessalonica between a third and a fourth of that of Asia Minor,†† instead of a half. It was scarcely possible to expect any correct distances upon a map so constructed, unless by the effect of a compensation of errors; and accordingly we find that such a compensation had considerable effect in causing the length of the Mediterranean to approach its true proportion; for, the coast of Asia Minor between Rhodes and Issus having been tolerably well known to navigators, the excess of distance between Rhodes and Sicily counterbalanced in great measure the defect of that between the Sicilian and Iberian Straits, so that

* Eratosth. ap. Strabon., p. 64.

† Dicæarch. ap. Agathem. Geogr. I. 1, p. 4.—Geogr. Gr. Min. Hudson, II.

‡ Eratosth. ap. Strabon., p 64. § Id. ibid., p. 62.

|| Ap. Strab., p. 63, 71, 115. ¶ Eratosth. ap. Strab., p. 93.

** See Gosselin, Géog. des Grecs., anal., p. 14-20; and the map entitled Eratosthenis Systema Geographicum.

†† Eratosth. ap. Strab., p. 68, 106.

the whole length of the Mediterranean, when measured by the stade of 700 to the degree of the equator, is found to be not more than a sixth or a fifth below the 30,000 stades, or thereabouts, which Eratosthenes ascribed to it.* Gosselin, however, viewed this measure of the Mediterranean in a very different light, both in itself and as a portion of the entire line from the Sacred Cape to the mouth of the Ganges. Finding that the true interval between the two extreme points is 100° of longitude, and that 70,000 stades, the length attributed to the entire line by Eratosthenes, gives exactly his rate of 700 stades to the degree, Gosselin concluded that such a coincidence could only have arisen from a true map, on which the degrees of longitude had been marked without any distinction of their diminished breadth, and that from these Eratosthenes had deduced his distances, ignorantly converting them into stades of 700 to the degree of latitude. In this opinion Gosselin was confirmed by observing that the distance given by Eratosthenes between the Sacred Cape and Issus, when reduced in the proportion of the length of a degree of longitude, in the latitude of Rhodes, would give accurately the length of the Mediterranean to within a few miles;† and the result appeared the more wonderful, as so late as the year 1768 the length of the Mediterranean was so little known that in the best modern maps it was made more than one-third greater than the reality. Combining this hypothesis therefore with the fact that Pytheas had some knowledge of a promontory, Calbium, which lay beyond the Sacred Cape of Iberia, and corresponded to Cape Finisterre of Brittany,—of an island, Baltia (Denmark or Scandinavia), which has given name to the Baltic Sea, and that he had even some idea of the position and extent of the British islands, and of the existence of Thulé, places which Pytheas could not have visited in his pretended travels, Gosselin concluded that both Pytheas and Eratosthenes had had access to the memoirs of some unknown ancient people to whom Europe and its seas were as well known as it is to ourselves. He shows that this people could not have been the Babylonians, or the Phœnicians, or the Carthaginians, or the Egyptians; and Bailly, who in his 'History of Astronomy' entertains a similar opinion, supposes them to have lived before the deluge.‡

§ 5. The practical astronomy and the geometry of the ancients having continued almost stationary after the age of Eratosthenes and Hipparchus, their subsequent progress in geography was little more than the result of the knowledge, gradually acquired,

* Eratosth. ap. Strabon., p. 87.—See Gosselin, Géogr. des Grecs. anal., p. 12, et seq.

† Ibid., p. 41.

‡ Bailly, Hist. de l'Astron. Anc., I. 3.

of all the countries which surrounded Rome as a centre. Without trigonometry, or any accurate method of determining longitudes, the only mode of approximating to a correct construction was by measurements and computations of distance, assisted by latitudes. Strabo and Pliny, by the numerous distances which they have given, have afforded an unconscious acknowledgment of this principle; and it is only from those distances that we can estimate the proficiency of the men of their time in tabular geography. In the year 122 B.C., the Romans commenced a series of real measurements, by the erection of milestones on their roads,* which, when it had been continued for two centuries on every great road of the empire, may, when checked by differences of latitude, have given them the means of forming an imperial map far more accurate in its general construction than had ever been in the power of the Greeks. The commission instituted at Rome by the great reformer of the calendar, in the year 44 B.C., and which for twenty-five years continued its active operations throughout the Roman world,† under the inspection of Agrippa and patronage of Augustus, produced about the end of that time a great painting or map, which was displayed in the portico of Agrippa.‡ Strabo, however, who wrote about that time, appears to have derived little advantage from these geographical acquirements of the Romans. But Strabo, as a geographer, was ignorant and negligent, as well as absurdly systematic. His work is extremely valuable with a reference to history; and from his criticisms of Eratosthenes and Hipparchus we derive the greatest part of our knowledge of Greek geography: but he was himself very deficient in the mathematical science of his time, and instead of improving, like geographers in general, upon his predecessors, he appears even to have neglected the opportunity which a long residence at Alexandria§ afforded him of acquiring as much as had long been known to that school. Of bearings and the relative positions of places and the forms of countries, his conceptions are often, for so extensive a traveller, surprisingly false, and can only be accounted for by his having had no capacity or taste for scientific geography. Not unfrequently he makes contradictory assertions as to the same place and country; and, upon the whole, we may say that although geography was much indebted to his labours as a traveller, the science in other respects degenerated in his hands. His system of the οἰκουμένη, or habitable earth, surrounded by one great sea, of which the Caspian was a gulf, like those of Arabia and Persia, was the same as that of Eratosthenes. The length of this habitable earth, he agreed, with some preceding geographers,

* Plutarch. in C. Grac. 7.
† Æthic. Cosmog. præf.
‡ Plin. H. N. iii. c. 2.
§ Strab. p. 101.

in supposing to be something more than double its breadth;* one of those unproved assumptions so detrimental to the progress of truth, into which the ancients were led by some favourite theories of proportion, and which Strabo, with all his reputed philosophy, seems never to have doubted, or thought of examining.†

A more correct basin of the Mediterranean was the principal improvement of Strabo on his Greek master; but by placing Marseilles 2400 stades, or about 1½° to the south of Byzantium, instead of 2° 17′ to the north, which is its real position, he committed an error greater than that of Eratosthenes, and so mischievous in its effects, that it distorted the whole of Europe. Even the British islands were better known to Eratosthenes than to Strabo, who supposed the British Channel to extend nearly to the Pyrenees, and that Ireland, scarcely habitable on account of cold, and peopled only by a few savages, was situated 4000 stades due north of the centre of Albion.‡ It was one of the curious consequences of his false principles, that he conceived the Pyrenees, the Garonne, the Loire, the Seine, and the Rhone, to have formed nearly parallel lines from south to north.

Pliny, who wrote thirty or forty years later than Strabo, but who appears to have been unacquainted with his work, though he consulted almost every other Greek geographer known to us, had the advantage of drawing from all the sources of which the streams centred in Rome; where he had not neglected the portico of Agrippa, for he often cites the authority of that illustrious Roman, and sometimes dissents from it. Pliny has left us between 500 and 600 distances, which, when compared with those of Strabo, bear strong marks of geographical improvement; although, as might be expected in an inquiry which forms only a small part of the laborious researches of the author, it is necessary to reject a portion of those distances as manifestly faulty, either in consequence of defects of the text, or of original error. Visionary theory and a wish to discover proportions in the works of nature, still continued to obstruct the march of practical truth; for Pliny, the most learned Roman of the most learned age of Rome, remarks as follows: "Europe appears to be greater than Asia by a little less than a half of Asia; and greater than Africa by the same quantity added to a sixth part of Africa. Europe is a third part of the whole earth with the addition of a little more than an

* Strabo, p. 64.

† The following is his singular mode of reasoning:—"It is confessed," he says, "by both ancients and moderns that the habitable earth is twice as long as it is broad. Eratosthenes, therefore, having extended the breadth from Jerne to Thule, a portion uninhabitable on account of the cold, was obliged, in order to preserve the aforesaid proportion, to give an undue extent to its length from the western cape of Iberia to the eastern extremity of India." (Strabo, p. 64.)

‡ Strabo, pp. 72 and 201.

eighth. 'Asia is a fourth *plus* a fourteenth, and Africa a sixth *plus* a sixtieth."

Great accessions were made to geography during the century which elapsed between the dates of Pliny and Ptolemy, though still without any improvement in the scientific means of methodizing those acquisitions. To the knowledge of their own country by the Greeks; to the discoveries produced by the conquests of Alexander; to the observations of his naval commanders and engineers; to the measurements of his σταθμοδόται and βηματίσται; to the subsequent conquests of Seleucus Nicator and Antiochus Soter; to the military surveys, itineraries, and measured roads of the Romans, which had been accumulating during four or five centuries of conquest and dominion, were now added the effects of commerce and social communication during two centuries of peace and prosperity. The consequent acquisitions to geography are sufficiently evident from the work of Ptolemy, particularly from those parts of it which relate to countries the least known to Roman geographers, such as Africa, the northern parts of Asia and Europe, and from none more than the British islands. These had already, as Pliny remarks, been made known, during thirty years before his time of writing, by the Roman commanders; and it is doubtless to the commerce of the Romans and Romanized Britons with Ireland, during the two preceding centuries of the Roman sway in Britain, and not to any Carthaginian or Phœnician materials obtained by Ptolemy (as Irish antiquaries delight in persuading themselves) that we are to attribute the knowledge of Ireland, shown in the work of Ptolemy, and of some existing names, such as the river Ovoca and the city Eblana.*

A preference of system to the collection of facts—that besetting vice of philosophers of all ages and in every branch of science—continued, however, to distinguish the Greeks to the latest period of geographical improvement; and hence Ptolemy, instead of obtaining for geography the advantages which might have been derived from a selection and verification of distances, and from a combination of them upon sound principles, applied the whole of his collected information to a system, which was founded in ignorance and error. The method which he followed had been long before recommended by Posidonius and Hipparchus, and doubtless it is the most scientific; but as very

* As many additions were made to the work of Ptolemy long after his time, the Irish chapter may not have escaped the same corruption. Marinus says [ap. Ptolem. i. 11] "that Philemon reported the breadth of Ireland from east to west to be 20 days; but that Philemon derived this information not from his own observation, but from certain merchants, more intent probably upon their own affairs than on geographical enquiries." This passage seems to point out at once the source of Ptolemy's knowledge of Ireland, and the cause of its imperfection.

little improvement had been made in astronomical geography since the time of Thales, we are not surprised that Ptolemy failed in a system which is adapted only to geography in its most advanced state, and which consequently had the effect of misleading himself, as well as those who relied upon his authority. Like geographers in general, he converted the labours of his immediate predecessor to his own use, and endeavoured to improve upon them. But in blaming that predecessor, Marinus of Tyre, for having separated facts from systematic arrangement, he leaves on us the impression that it would have been better for us to have lost his own meagre tables than the work of Marinus, which, as he thus gives us reason to believe, contained, together with the development of his method, many important facts and simple results of experience not yet tortured into an erroneous system. The latitudes of Ptolemy are too often wide of the truth, to allow us to believe that they were derived from gnomonic observation; as well as the longitudes, therefore, they were for the most part calculated from distances, very few of which had been measured. And hence in general it may be said, that, excepting the information sometimes derived as to the relative situation of places by means of the differences in latitude or longitude, the utility of the work of Ptolemy consists chiefly in its catalogue of ancient names chorographically arranged.

The great errors of Marinus and Ptolemy appear to have arisen chiefly from the want of instruments for the correct observation of time, whence, although they understood how to deduce differences of longitude from eclipses and other celestial phenomena, they were scarcely ever able to obtain observations of that kind with sufficient precision for geographical purposes, but on the contrary appear often to have been misled by them into a confirmation of errors in excess, originating in itineraries not sufficiently reduced into direct distance. Ptolemy himself was well aware of the prevalence of the latter cause of error, and has unconsciously given a remarkable instance of the former in his difference of longitude between Arbela and Carthage, which he has placed at an interval of 45° of longitude, because an eclipse of the moon was reported to have happened three hours earlier at the former than at the latter.* The real difference, however, is not more than 33°, so that the observers made an error in excess of forty-eight minutes of time. Instead of about 75° of longitude between Cape St. Vincent and the mouth of the Indus, Ptolemy allows 110°; † and as a portion of this enormous error, he makes the distance from the Iberian promontory to Issus 67° instead of 41°.‡ The distance in stades had at the same time, in the pro-

* Ptolem. i. 4. † Ibid. ii. 5; vii. 1.
‡ Ibid. i. 12; ii. 5; v. 8.

gress of practical experience, been approaching to the truth; the 30,000 stades of Eratosthenes having been reduced by Agrippa to 27,600.* This number, indeed, still exceeded the true distance by five or six thousand stades of 600 Greek feet; but such an excess might easily occur in the computation of a distance which the ancients had no means of correctly measuring, and which, in fact, was nearer to the truth by a half than that which the moderns, with all their advantages, had obtained seventy years ago.† It appears, therefore, that Marinus, trusting to his differences of longitude in hours or degrees, was under the necessity of rejecting either the received computation of the length of the Mediterranean, or the rate of 700 stades to the degree, and that he chose the latter, accommodating the length of the Mediterranean in stades to his degrees of longitude, by supposing a rate of 500 stades to the degree of latitude, and of 400 to the degree of longitude in the parallel of Rhodes; for this rate multiplied by 67 will give 26,800 stades for that distance, differing only 1800 stades from the computation of Agrippa.

That such was the process of Marinus, followed by Ptolemy, and not a blind adoption of the second computation of Posidonius, which equally gave a rate of 500 stades to the degree of latitude, seems evident from the fact that Ptolemy was aware of the error of Posidonius, as well as of Eratosthenes, in placing Alexandria and Rhodes on the same meridian; for the tables of Ptolemy mark a difference of 2° 10′ in their longitude, or not more than 20′ less than the truth.‡ In reference to the main question, therefore, of the present memoir, that of the singleness of the stade, there is nothing adverse to that hypothesis in the proportion of the stade to the degree, as employed by Marinus and Ptolemy.

Notwithstanding the imperfection of the work of Ptolemy, it may be considered as the extreme limit to which ancient geography ever attained, and it continued to be the chief, or rather the only, guide of Greeks, Arabs, and every other people, until long after the revival of learning. The many additions and alterations, which the text evidently received in the course of transcription, cannot increase our confidence in a document which from its nature is of such questionable authority, and it is therefore seldom to be relied on, unless when confirmed or illustrated by collateral evidence.

§ 7. If we reject the variety of stades derived from the Greek computations of the perimeter of the earth, as void of any

* Plin. H. N. *ut supra.*

† Gosselin remarks, that in the year 1768 the maps of Samson, the best then known, gave a length of the Mediterranean more than a third greater than the reality.

‡ Ptolem. iv. 5; v. 2.

foundation in reality; if we consider that, from the time of Herodotus to the end of the second century of the Christian era, there is no direct testimony to the existence of any metrical stade of a different standard from that of 600 Greek feet; that Polybius, Strabo, Dionysius of Halicarnassus, Appian, Livy, Vitruvius, Columella, Pliny, Frontinus, Marcian of Heracleia,* all confirm that measure by valuing the stade at one-eighth of the Roman mile, we cannot fail to conclude that historians and geographers constantly intended this stade, and no other, in their statements of distance, however erroneous may be the computations reported by them when referred to this measure. Is it possible that Eratosthenes, Posidonius, Hipparchus, Strabo, Pliny, Ptolemy, and Marcian of Heracleia, when examining and criticising former measures, or endeavouring to discover the causes of the disagreement of authors in particular distances, should not have adverted to the variety of stades had it existed? Or were they ignorant of the fact? Gosselin, who believed in this ignorance, as well as in the existence of six different stades, might well exclaim, " Cette ignorance, que toute l'Ecole d'Alexandrie et tous les géographes de l'antiquité paroissent avoir partagée, est assurément une des choses les plus remarquables et plus étonnantes que puisse présenter l'histoire de la géographie ancienne."†

In Greece Proper the stade, as we have seen from Pausanias, retained its true length until the end of the second century, and probably as much longer as the maintenance of the Olympiads and of the four Sacred Games secured the preservation of its standard in the Stadium. In every other part of the Roman world, where reverence for Greek customs and the imitation of them were rapidly passing away, when the true standard of the stade was of little importance or interest, this neglect would naturally be followed by uncertainty as to its length. It is not surprising, therefore, to find that, in the course of the three following centuries, the mile is represented by some writers to have been equal to 7½ stades, and by others to 10 stades,‡ until at length it appears to have been applied to various measures of distance, without any reference to its origin.§

The author of those times, who, by the general character of his

* See above, p. 2, note §.

† Géogr. de Strabon, i. p. 182, note 1.

‡ Dion Cassius (52, 21) describes a distance known to have been 100 Roman miles as 750 stades, and this we find stated to have been the proportion of the stade to the mile by some of the grammarians (Suidas and Photius in Στάδιον. See also Julian of Ascalon ap. Harmenop. Promptuar. tit. 4). And yet the Jerusalem Itinerary says, Stadia mille quod facit millia centum (Wesseling, p. 609); and a similar proportion may be deduced from the average rate of the peripli, or stadiasmi, when compared with the truth.

§ See Mémoires de l'Académie des Inscriptions, iv. p. 292; xxxi. p. 295.

work, lends the greatest weight to the belief of a real variety of stades, is Censorinus: he distinguishes three stades; namely, the Italic of 625 feet, the Olympic of 600 feet; and the Pythic of 1000 feet.* As Censorinus makes no distinction between Roman and Greek feet, we are to infer, notwithstanding the Greek names, that Roman feet alone were intended by him; and this is confirmed by his Italic stade, which, having consisted of 625 feet, was evidently no other than the Greek stade in Roman feet. His Olympic, therefore, was the Roman stade of 8⅓ to the Roman mile, or, in other words, a measure of 600 Roman feet; and the three can only be regarded, supposing Censorinus to have been correct, as Italian measures of the third century, to two of which the Romans had been pleased to attach Greek names, and to the third, or Italic, a name which may be described as the reverse of that really belonging to it, since it was, in fact, the Greek stade. Considering, indeed, the origin and use of the stade in Greece, and the evidence of the Stadia still extant, it is impossible to believe that any such measures as the Olympic and Pythic stades of Censorinus were ever employed in Greece. We may be assured, at least, that the Pythic stade was not taken from the Stadium of Delphi, which is still sufficiently preserved to show that it differed not in length from the other Stadia of Greece. It is possible, however, that 1000 feet may have been the length of the curriculum of the Pythic *Hippodrome*.

With the extinction of paganism in Greece, or soon afterwards, the stade probably ceased to be employed, in that country, as a Greek measure. The use of the mile, like many Roman customs adopted by the Greeks, has continued to the present day, not, however, as a distance consisting of any determinate number of the still-existing national measures of feet, cubits, or fathoms (ποδάρια, πηχεῖς, ὀργυιαὶ), but merely as a computation, which, as common in such cases, has fallen below the real standard. The diminution began, probably, with the neglect of the Roman roads and the destruction of the milestones.

§ 8. It may still remain due to the great name of Rennell to advert to the conclusion at which he arrived in examining this question, and which nearly concurred with that of Delabarre; namely, that there were two stades, the one of 600 Greek feet, the other considerably shorter.† Having observed that the distances given by eight different authors, of whom the oldest was

* Nam et Eratosthenes geometricâ ratione collegit maximum terræ circuitum esse stadiorum CCLII millium: ita Pythagoras quot stadia inter terram et singulas stellas essent indicavit. Stadium autem in hac mundi mensurâ id potissimum intelligendum est, quod Italicum vocant pedum DCXXV, nam sunt præterea longitudine discrepantia ut Olympicum quod est pedum DC, item Pythicum pedum CIↃ.—Censorin. de die nat. 13.

† Geography of Herodotus, section 2.

Herodotus, and the latest Arrian, varied only a fourteenth in the length of the stade, as resulting from a comparison of those distances with the reality,—the longest being the 696th, the shortest the 750th part of a degree of the great circle,—Rennell justly thought that such a difference in computed distances might easily have been the result of inaccuracy. But observing, also, that all these rates were below that of 600 Greek feet to the degree, he inferred that, besides that measure which belonged to the stadium or place of gymnastic exercise, there was a shorter measure for itinerary purposes, which he deduced from the average of the several rates just alluded to, and reckoned at the rate of 718 to the degree. It has been argued that, unless a much shorter stade than that of 600 Greek feet existed, it was impossible that marches of from 150 to 200 stades could have been customary, as they appear to have been, particularly from Xenophon. The distances of Xenophon, however, were not in stades, but in computed parasangs, presumed to be of 30 stades each; they were computations, therefore, similar to those of hours in the present day, when made by those who are not in possession of watches. Pliny, an author not very scrupulous as to accuracy, complains of the uncertainty of the parasang. We know that the Romans often marched 20 M. P., or 160 stades of 8 to the mile, and sometimes 24 M. P., or 192 stades, in 5 hours of summer, or 6 of equinoctial time.* There is greater weight, therefore, in the remark of Rennell that, had the stade of 600 Greek feet been used as the itinerary measure of the Greeks, "the examples could not uniformly have given a standard short of it, as is found to be the case."† To this we may reply, that such an itinerary stade was either a measure of 513½ Greek feet, or it consisted of 600 feet, which feet were equal to about 10 inches English; both inadmissible suppositions: the first because all evidence opposes the belief that the word stade was ever applied by the Greeks to any other number of their feet than 600; while, in the latter alternative, the 600th part of the measure would have been too short for any foot.

This itinerary stade, therefore, is a mere inference from a comparison of ancient computations with real distances, unsupported even by a nominal standard. Such a measure is a mere conjecture, a computed measurement, varying with the knowledge and accuracy of the writer, or the skill, in the computation of distances, of himself or of those from whom his information was derived: it was less precise, in short, than the computed itinerary hours of modern orientals. It is not surprising that distances so reckoned should almost constantly have given a stade below the true standard. In

* Plin. H. N. 6, 25 (30).

† Geogr. of Herodotus, sect. 2.

like manner, we find that the numerous distances stated in Roman miles by Pliny, although preserving in general a more just proportion to one another than those reported by any other author, are, with the exception of such as are evidently erroneous, almost invariably above the reality. The same observation is applicable also, though naturally not in so great a degree, to the ancient documents which are strictly topographical, such as the itineraries, peripli, and stadiasmi; and it arose from the same cause, namely, that the far greatest proportion of distances, inserted therein are not measurements, but computations. Hence those documents are full of original errors, as well as of such as have arisen from a repetition of copies in the course of ages. It happens, moreover, most unfortunately, that our itineraries of Roman roads, a complete and accurate collection of which would have supplied a series of true measurements on all the most important lines in the ancient world, are of a late date, and obviously incomplete as well as incorrect.

These and other preceding observations are not intended to support an opinion that the distances reported in ancient history are generally unworthy of the notice of the investigator of ancient geography. On the contrary, they furnish some of his most valuable materials: always, however, to be examined with suspicious criticism, and to be corroborated, if possible, by other testimony, but not to be adjusted by a varying scale of stades derived from a supposed measurement of the globe by some unknown ancient people: for if geology agrees with sacred history in showing that man has not long been an inhabitant of this planet, geographical inquiry equally tends to the persuasion that his goodly freehold has never yet been surveyed; though the present age has made some advances in this useful undertaking, and the Royal Geographical Society will, it is hoped, continue that successful progress, which has already merited the applause of all who feel an interest in science.

II.—*Notes on a March from Zoháb, at the foot of Zagros, along the mountains to Khúzistán (Susiana), and from thence through the province of Luristan to Kirmánsháh, in the year* 1836. By Major RAWLINSON, of the Bombay Army, serving in Persia. Communicated by Viscount PALMERSTON.

[Read the 14th and 28th January, 1838.]

PASHALIK OF ZOHAB.—Zoháb is a district of considerable extent, lying at the foot of the ancient Zagros. It is bounded on the N.W. by the course of the river Diyálah, on the E. by the mountains, and on the S. by the stream of Holwán. It formed one of the ten páshálíks dependent upon Baghdád, until about thirty years ago, when Mohammed 'Alí Mírzá, prince of Kirmánsháh,* annexed it to the crown of Persia. At the treaty concluded between Persia and the Porte, in 1823, it was stipulated that the districts acquired by either party during the war should be respectively surrendered, and that the ancient frontier-line should be restored, which had been established in the time of the Safaví monarchs. According to a subsequent treaty, Zoháb ought certainly to have been given up to the Turkish authorities, but Persia had neither the will to render this act of justice, nor had the páshá of Baghdád the power to enforce it; and Zoháb, although still claimed by the Porte, has thus remained to the present day in possession of the government of Kirmánsháh.

Zoháb, having been acquired in war, is khálisah, or crown land. It has been usually farmed by the government of Kirmánsháh, at an annual rent of 8000 tománs (4000*l.*), to the chief of the Gúrán tribe, whose hardy I'liyát inhabit the adjoining mountains, and are thus at all times ready to repel an attack of the 'Osmánlís. The amount of its revenues must depend, in a great measure, upon the value of rice and corn, its staple articles of produce; but in years of plenty, when the price of these commodities is at the lowest possible rate, a considerable surplus will still remain in the hands of the lessee. The revenue system in this district is simple, and more favourable to the cultivators than in most parts of Persia. It is thought derogatory to the chief to take any part of the cultivation into his own immediate hands. He distributes the domain to his dependents, and at the harvest receives as his share of the produce—of rice, two-thirds; of corn, one-half. A greater share is always demanded from the cultivators of rice than of corn, in consequence of the water consumed in its irrigation, which is the property of the landlord or of government, and is rarely to be obtained without considerable expense and labour.

The rice-grounds of Zoháb are chiefly irrigated by an artificial

* More commonly Kirmán Sháhán.

canal, brought from the Holwán river, a distance of about 10 miles. The canal is said to have been an ancient work; but was repaired and rendered available to its present purposes only about a hundred years ago, by the same páshá who subsequently built the town of Zoháb.

I was present for three years at Zoháb, in the time of harvest, and the revenues accruing to the chief averaged 10,000* tómáns annually, of which the following is a rough statement:—

From produce of rice, 2000 kharwárs,† at 2 tómáns per khr. .	4000
Do. wheat and barley, 2500 kharwárs, at 1 tómán per khr. .	2500
Rent of the káravánseráï of Sar Púl, which includes the transit-duty upon merchandise, and the profits arising from a monopoly of the sale of grain to the Kerbelái pilgrims . . .	1000
Rent of the káravánserái of Kasri-Shírín . . .	200
Contract for the dárógháh-garí ‡ of Zoháb; the emoluments of this arising from the rent of shops in the Zoháb bázár, and several petty items of taxation	800
Fees exacted from the I'liyát of Kurdistán, for permission to pasture their flocks during the winter in the grazing-grounds of Zoháb	1000
Growth of cotton, rent of mills, orchards, and melon-grounds, value of pasturage, &c. &c.	500
Total, tómáns,	10,000

Under the Turkish rule Zoháb yielded, with its dependencies, an annual sum of 30,000 tómáns; but it then included several fertile and extensive districts, which are now detached from it; and there were also above 2000 Ra'yats § resident upon the lands; whereas at present this number is reduced to about 300 families; and the great proportion of the cultivation is in the hands of the Gúrán I'liyát, who, after sowing their grain in the spring, move up to their summer pastures among the mountains, and leave only a few labourers in the plains to get in the crops. The soil of Zoháb is naturally very rich; but owing to the little care bestowed on its cultivation, a tenfold return is considered as good. Manure is never employed to fertilise the lands. After the production of a rice-crop the soil is allowed to lie fallow for several years, in order to recover its strength, or is only sown with a light grain. The interval between two rice-crops upon the same ground is never less than seven years; but even this is said to exhaust the soil. Wherever the extent of the lands will admit of it, an interval of fifteen years is allowed.

The grain of Zoháb is principally disposed of to Arab and

* The tómán now current in Persia is equal to 10*s.* of English money.
† The kharwár (literally the load for an ass) is equivalent to 653 lbs.
‡ The dároghah-garí is the office of dároghah, or police-master.
§ Properly ri'ayyat, i. e., non-muselmán subjects; pronounced ra'yáh in Turkey.

Turkish traders from Baghdád. They buy it as it lies stacked upon the ground, and, conveying it to Baghdád upon mules and camels, without paying any export duty, realise a considerable profit. Scarcely a fifth part of the arable land in this district is now under cultivation; and certainly the revenues might be raised, with proper care, to ten times their present amount.

The town of Zoháb was built about a hundred years ago by a Turkish páshá, and the government continued to be hereditary in his family till the conquest of the páshálik by the Persians. The capital was surrounded by a mud wall, and may have at first contained about 1000 houses. From its frontier position, however, it has been exposed to constant spoliation in the wars between Turkey and Persia, and is now a mass of ruins, with scarcely 200 inhabited houses. There are about twenty families of Jews here, and the remainder are Kurds of the Sunní sect.

The geography of the district of Zoháb will be best understood by a reference to the accompanying map. At the northern extremity of the district of Zoháb is the little plain of Semírám, a natural fastness of the most extraordinary strength, which is formed by a range of lofty and precipitous mountains, extending in a semicircle from the river Diyálah, here called the A'bi-Shírwán, and enclosing an area of about 8 miles in length, and 4 in breadth. The A'bi-Shírwán is only fordable in this part of its course for a few months in the year; and the passes of the mountain-barrier of Semírám may be defended by a handful of men against any numbers that can be brought against them. Semírám is inhabited by detached tribes of Sharaf-Báyinís, Yezdán-Bakhshís,* and Arabs, who yield allegiance to Suleïmániyah, or Zoháb, as the chief of either place is for the time enabled to enforce his authority. The proper boundary, however, between Suleïmániyah and Zoháb is the Shírwán river. The early part of the course of this river has been laid down most incorrectly in the maps hitherto published. It is usually believed to take its rise at Suleïmániyah, but this is erroneous. The real source of the Diyálah is at Sangur nearly 2 degrees of longitude E. of Suleïmániyah: it is crossed on the road between Kirmánsháh and Sihnah, and, receiving afterwards numerous petty streams from the mountains of Sháhú and A'vrommán,† it becomes a considerable river. Its direction is here W., inclining to the N. Forcing its way among the mountains, it reaches the remarkable defile of Darnah, where are the ruins of a town and castle, which, on account of their very advantageous position, seem to have acquired some consequence as the stronghold of the rulers of the surrounding country. Darnah is men-

* Given by God. † Pomegranate-water.

tioned in the history of the Kurds* as one of the chief districts of Holwán; and the páshás of Zoháb retained up to the period of their extinction the title of Darnah beïgí, or lord of Darnah. We may thus, with tolerable certainty, assign the Darna of Ptolemy† to this position; and if the Diyálah represents the ancient Gyndes, which, after much reflection, I am inclined to believe, then the διὰ Δαρνέων of Herodotus ‡ will refer to the same place. Before it enters the plain of Semírám the A'bi-Shírwán receives, at Gúndár, a considerable stream called the Chami zamakán, which rises near Gahwárah, in the heart of the Gúrán country, and above the junction the Shírwán river is at all times fordable. It enters into the plain of Semírám by a tremendous gorge in the mountains, where there is no possibility of passing along its banks. In this plain it is joined from the right by the united streams of Zalm and Táj-rúd, the former flowing from Suleïmáníyah, and the latter from the plain of Shahri-zúr. The confluence of these two streams takes place at a few miles' distance from the A'bi-Shírwán; but the united arms do not equal the main river by one-half. One of the few passes into the fastness of Semírám is along the banks of the river, where it emerges from the plain. The pathway, however, is in the bluff face of a precipice, and is only 2 or 3 feet in width, so that a loaded mule cannot pass it. Below this is the ford of Bánah-khílán, on the high-road between Suleïmáníyah and Kirmánsháh. When I was there, at the end of May, the river had a breadth of about 120 yards, and the ford was not practicable: during the summer and autumn, however, it can be crossed without much difficulty. The A'bi-Shírwán now flows in a south-westerly direction through an open country, receiving various petty streams, both from the right and left to Bíñ-kudrah. where it was crossed by Rich; § and the lower part of its course to the Tigris is well known. It seems to have derived its title of Shírwán from a city of that name upon its banks, at the spot in the vicinity of Bíñ-kudrah, where Rich met with a remarkable dapah,|| or mound, still called Shírwánah. It only retains this title to the point of its junction with the Holwán river, near Khánikín. Below that it is called the Diyálah. The eastern branch of the river was named the Shírwán as long ago as the fourteenth century.¶ Below the junction of the Holwán river it was at that time entitled the Támarrá; farther down it was called the Nahrawán;** and at the point of its confluence with the Tigris, the Diyálí.

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* Sharaf Námah, or Táríkhi-Akrád.—Pers. MS.

† Ptol. lib. vi. chap. 1, p. 146 (39° 10′ N. 86° E.).

‡ Lib. i. c. 189. [Δαρνέων is a conjectural emendation for Δαρδανέων.]

§ Rich's Kurdistan, vol. ii. p. 273.

|| Pronounced tapáh or tepéh.

¶ See Nuz-hatú-l Kulúb.—Pers. MS.

** The real *Nahrawán* (the Ναρβὰν of the campaigns of Heraclius) was the great

But to return to Semírám. The name could not fail to call to my recollection the Assyrian queen, Semiramis, whom the ancients believed to have adorned Persia with many magnificent works of art. I therefore searched eagerly for ancient monuments; and though I failed to discover any in the plain itself, yet across the river, at the distance of about 3 farsakhs, on the road to Suleïmáníyah, I heard of sculptures and statues which would well merit the attention of any future travellers in this country. The place is called Páï K'al'ah, the foot of the castle, or But Khánah, the idol temple. From the hills above Semírám, the plain of Shahri-zúr, with its numerous villages, is distinctly visible, and on a clear day the town of Suleïmáníyah may be seen bearing N.W., at the distance of about 50 miles.

The western boundary of Semírám is formed by a prolongation of the chain called Kará-tágh,* through which the river forces its way by a narrow and precipitous cleft; to the south of the river the mountains rise up most abruptly and to a very considerable elevation, probably about 5000 feet above the plain, and from hence the range stretches in a succession of rocky heights for about 50 miles in a southerly direction till it is lost in the sand-hills to the west of Zoháb. These heights compose detached hill-forts of great strength: the three most considerable are named Sar-Khushk (the dry peak), Sar-Tak (the single or detached peak), and Bamú.† There are two roads from Semírám to Zoháb; the direct road leads across the range from the plain of Semírám into a hilly and richly-wooded valley named Pushi-kúh, which runs along upon the eastern face of Sar-Khushk, Sar-Tak, and Bamú, till it opens into the plain of Zoháb: it is difficult, and measures 45 miles: the other, ascending the Semírám mountains by the same pass, diverges at the summit to the right, and descends by a defile named the Tangi Mil‡ into the plain of Hershel, at the foot of Sar Khushk, upon its western face, and it here joins the high road from Suleïmáníyah to Kirmánsháh. Hershel is a well-watered plain, but it is little cultivated, as it is exposed to constant forays from the Jáf I'liyát of Suleïmáníyah, who have it in their power, at any time during the summer, to cross the river by the ford of Bánah-khílán, destroy the crops, and carry off the cattle of the Persian

canal derived from the Tigris at Sámará; but after this was destroyed, the Diyálah seems for a short time to have assumed the name. See Yákútí, Abú'lfedá, and Hamdu-llah Mustaúfí, author of the Nuz-hatu-l-kulúb.

* The black mountains.

† All these names of hills in Kurdistán ending in *u* are contractions for *kúh*, "a hill,"—thus *Sháhú*, *Dáláhú*, *Darú*, and *Bamú*, should be *Sháh-kúh*, *Dálah-kúh*, *Dará-kúh*, and *Bamú-kúh*.

‡ *Mil*, in Kurd, signifies a defile; Tangi Mil, therefore, is "the pass of the defile."

ra'yats. Adjoining to the plain of Hershel, at the foot of Sar-Tak, is the plain of Húrín. At this place are found the ruins of a city of great extent and apparently of the most remote antiquity: the foundations of the buildings are now alone visible, composed of huge unhewn masses of stone, and exhibiting walls of the most extraordinary thickness. I have never seen a similar style of building in Persia; and connecting it with another circumstance, which I shall presently explain, I am inclined to believe Húrín to be a ruin of the Babylonian ages. The ignorant Kurds call the place Shahri-Fadak,* believing it to be the town of that name captured by Mohammed and bestowed upon Fátimah, and they attribute its demolition to 'Alí.† Behind the town, in a gorge of the mountains under the peak of Sar-Tak, is an old ruined fort, which must have been of great strength; it is built on a detached mass of rock, and could only have been ascended by ropes or ladders: it is called Kal'ahi Gabr (the Gabr castle), and, apparently, is a work of a much later age than the town in the plain.

To the S. of Húrín, at the distance of 2 farsakhs,‡ is the village of Sheïkhán, so called from certain Sunní dervíshes here interred, whose tombs, surmounted with their white cupolas, and embosomed in orchards, form a very picturesque and agreeable object. In the mountain gorge which contains the village is a tablet sculptured upon the face of the rock, exhibiting the same device as is often seen on the Babylonian cylinders. A figure, clothed in a short tunic and armed with a strung bow in his left hand, a dagger in his right, and an axe in his girdle, tramples upon a prostrate foe of pigmy dimensions, whilst another diminutive figure kneels behind with his hands clasped, as if supplicating for mercy; a quiver of arrows placed erect stands by the side of the victor king, and the tablet is closed with a cuneïform inscription, divided into three compartments of four lines each, and written perpendicularly in the complicated Babylonian character, which I had never before seen, except upon bricks and cylinders. The tablet is of miniature dimensions, being only 2 feet in height and 5 in breadth; the execution is also rude, and the inscription, of which I have a copy, appears to be unfinished. I believe there is no relic of a similar nature existing in Persia, but it is chiefly interesting as tending to fix the era of the neighbouring town of Húrín, the identification of which, however, I confess myself quite at a loss to determine. From Sheïkhán to

* The real *Shahri-Fadak* was in Arabia, two days' journey from Medínah.

† Kurdistán is full of traditions regarding *'Alí*, but we know from history that he never crossed the Tigris but once to fight the battle of *Nahrawán*.

‡ The farsakh is a very uncertain measurement, but in this part of Persia it may be valued at 3¾ miles.

Zoháb the distance is 6 farsakhs; the road recrosses the range by a very easy pass called Sar-Kal'áh, and from thence traverses an open country to Zoháb. The distance from Semírám to Zoháb by this route, through Hershel, Hírín, and Sheïkhán, is about 60 miles.

Immediately overhanging the town of Zoháb to the east is the fortress of Bán Zardah,* or, as it is sometimes called, Kalahi-Yezdijird. This is the stronghold of Holwán, to which Yezdijird, the last of the Sasanian kings, retreated after the capture of Ctesiphon by the Arabs, and it is a noble specimen of the labour which the monarchs of those ages bestowed upon their royal buildings. It is formed by a shoulder projecting westward from the mountain of Dáláhú, girt upon three sides by an inaccessible scarp, and defended upon the other, where alone it admits of attack, by a wall and dry ditch of colossal dimensions, drawn right across from one scarp to the other, a distance of above 2 miles: the wall is now in ruins, and the debris have fallen down into the ditch at its foot, but it still presents a line of defence of no ordinary description. The wall is flanked by bastions at regular intervals, and if an estimate may be formed from a part of it, which still preserves something of its original character, it would seem to have been about 50 feet in height and 20 in thickness; the edge of the scarp has also been faced all round with a wall of less dimensions. The hill itself is elevated very considerably above the plain of Zoháb, perhaps 2000 feet; the slope from the plain is most abrupt, and it is everywhere crowned by a scarp varying from 300 to 500 feet: the northern side of the hill is higher than the southern, and the table-land therefore of the fort, containing about 10 square miles, presents an inclined surface throughout. At the N.E. angle, where the scarp rises in a rocky ridge to its highest point and joins the mountain of Dáláhú, there is a pass which conducts into the fort, the ascent rising gradually along the shoulder; the whole way from the town of Zoháb is easy enough, but the descent on the other side into the table-land of the fort is by a most precipitous and difficult gorge. A wall has been thrown across the jaws of the pass; towers have been erected on either side to support it, and somewhat lower down the defile, where the jutting rocks nearly meet, two strong castles have been built opposite each other, which command the narrow entrance, and render it quite secure against attack. Altogether, this fortress may be considered to have been perfectly impregnable in an age when artillery was unknown. In the midst of the gorge is the tomb of Bábá Yádgár, the most holy

* *Bán*, in Kurdish, signifies "above," and is very commonly applied to hills; it is, perhaps, the same word as the Scotch *Ben*.

place among the Kurd mountains, to which I shall presently have again occasion to allude. Lower down there is a natural double cave in the rock, very difficult of access, which is called the Harem-khánah of Shahr-bánú, the daughter of Yezdijird, who afterwards became the wife of the Imám Hasan: it is a curious place, and looks like the grotto of a hermit At the foot of the pass, where it opens upon the fort, is the little village of Zardah, surrounded by gardens which are watered by a delicious stream descending from the gorge. Near this there are the remains of two contiguous palaces, named the Díwán-khánah and Harem khánah* of Yezdijird: the one is a quadrangular building of about 100 yards square, of which the foundations alone remain, and these are now nearly hidden by the gardens of the village of Zardah; the other is an enclosure of 350 paces in length by 150 in breadth; it contains the remains of numerous buildings, the principal of which is a low circular tower of solid masonry, which would seem as though intended for the base of a pavilion or some other temporary superstructure. The architecture of these buildings is in the same rude though massive style which has been described by Rich in his account of the ruins of Kasri-Shírín and Haúsh Kerek,† and which, indeed, characterises all the Sásánian edifices in this part of Persia. The wall of Bán-Zardah seems alone to have had more than ordinary pains bestowed on it.

To the W. of Zoháb, and intervening between that plain and the A'bi-Shírwán, there is no inhabited place but the little hamlet of Kasri-Shírín. The country is broken into a sea of sandhills, and there is very little ground that would admit of cultivation; it affords winter pasturage, however, to the Gúrán and Sinjábí tribes, and the I'liyát from Sulemmáníyah, and Kurdistán also, bring down their cattle to graze here. Bín-kudrah, although on the left bank of the Shírwán, and thus properly belonging to Zoháb, is considered a Turkish town, and pays its revenue to Baghdád. To the E., between Zoháb and the mountains, the country is more fertile. The Holwán river rises in the gorge of Ríjáb, on the western face of Zagros, about 20 miles E. of the town of Zoháb. It bursts in a full stream from its source, and is swollen by many copious springs as it pursues its way for 8 miles down this romantic glen. The defile of Ríjáb is one of the most beautiful spots that I have seen in the East; it is in general very narrow, scarcely 60 yards in width, closed in on either side by a line of tremendous precipices, and filled from one end to the other with gardens and orchards, through which the

* The *Díwán-khánah* is the outer palace or hall of audience; the *Harem-khánah* is the seraglio.

† Rich's Kurdistan, vol. ii. p. 261.

stream tears its foaming way with the most impetuous force until it emerges into the plain below at the foot of the fort of Bán Zardah; the village of Ríjáb, containing about 100 houses, is situated in a little nook above the stream, where the glen widens into something like a bay: the inhabitants are all Sunnís, and they have a very holy and ancient mosque, supposed to have been built by 'Abdullah, the son of 'Omar. Ríjáb is, from its situation, a place of great strength; it formerly was included in Zoháb, but now belongs, as private property, to the Gúrán chief. The peaches and figs which the gardens of Ríjáb produce are celebrated throughout Persia; and it is to the latter that Yákút* alludes when he says, "the figs of Holwán are not to be equalled in the whole world."† The Holwán river, after it reaches the plain, is only fordable in the autumn months. On its right bank is the plain of Zoháb, upon its left the rich district of Bíshíwah, which stretches about 2 farsakhs in extent to the foot of the gates of Zagros, and is also the private property of the Gúrán chief. There are three roads conducting from Zoháb to Kirmánsháh, the one across the plain of Bíshíwah to the gates of Zagros, where it joins the high road from Baghdád, and ascends the pass of Ṭáki-Girráh to the plain of Kirrind. This pass, the great thoroughfare of communication in all ages between Media and Babylonia, is named in the maps Tac Ayacgui, or Lesotver. I am quite ignorant from whence such titles have been borrowed, for they are certainly neither known in the country nor have I met with them in any oriental author. By the geographers the pass is called 'Akabah-i-Holwán (the defile of Holwán), and among the Kurds, Gardanahi-Ṭáki-Girráh (the pass of Ṭáki-Girráh). The Ṭáki-Girráh, which signifies "the arch holding the road," is a solitary arch of solid masonry, built of immense blocks of white marble which is met with on the ascent of the mountain; it is apparently very ancient, and the name and position suggest the idea of a toll-house for the transit-duty upon merchandise crossing the Median frontier; it nearly assimilates, however, in situation to Mádaristán, which is described by the orientals as one of the palaces of Bahrám Gúr,‡ and it may possibly therefore have formed a part of it: it would also seem to denote the spot where Antiochus erected the body of the rebel Molon upon a cross.§

The second road from Zoháb conducts across the hill of

* But Yákút is not the author of the Muráṣidu-l-iṭṭilá'.

† See Muráṣidu-l-Iṭṭilá'.—Arab MS.

‡ See Muráṣidu-l-Iṭṭilá' and A'tháru-l-Balád.—Arab MSS. This is the name that is given in the 'Geographia Nubiensis,' p. 205, Madar and Asian (by an error of transcription for Máderástan, ı being put for *t*).

§ Polyb. lib. v. c. 5.

Zardah to Ríjáb, up the defile to Bíwaníj, a plain on the high table-land of Zagros, and from thence by Gahwárah, the residence of the Gúrán chief, and Máyidasht, to Kirmánsháh. The third, more northerly, crosses the mountains behind Dáláhú, and descends into the plain of Máyidasht by Bíyáma, Shámár, and Takhti-Gáh. I have travelled all the three routes, and laid them down accordingly in my map—the two last, however, are very difficult, and could never have been lines of general communication.

The climate of Zoháb is most unhealthy, particularly in the autumn, after the rice-crops have been gathered in, and the noxious gases, which were exhausted in the vegetation, diffuse themselves in the surrounding atmosphere. The soil is everywhere volcanic, and, as in the case of all the districts lying along the foot of this whole range of mountains, the waters appear to be either sulphureous or chalybeate. A spring in the gorge of Zardah affords the only good water in the neighbourhood, and whilst resident at Zoháb I always had a load of this water brought daily for my use.

The town of Zoháb has been usually considered the representative of the city of Holwán—but this is incorrect. The real site of Holwán, one of the eight primeval cities of the world, was at Sar-Púli-Zoháb, distant about 8 miles south of the modern town, and situated on the high road conducting from Baghdád to Kirmánsháh. This is the Calah of Asshur,* and the Halah of the Israelitish captivity.† It gave to the surrounding district the name of Chalonitis, which we meet with in most of the ancient geographers.‡ Isidore of Charax particularises the city, under the name of Chala,§ and the Emperor Heraclius appears to allude to the same place as Kalchas.||

By the Syrians, who established a metropolitan see at this place soon after the institution of the Nestorian hierarchy of Assyria, in the third century of Christ, it was named indifferently Calah—Halah—and Holwán;¶ to the Arabs and Persians it was alone known under the latter title. The etymological identity is, I believe, the best claim which Holwán possesses to be considered the representative of the Calah of Asshur; but, for its verification as the scene of the Samaritan captivity, there are many other curious and powerful reasons. We find in Strabo that this region along the skirts of Zagros was sometimes adjudged

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* Gen. x. 11. † 2 Kings xviii. 6; 1 Chron. v. 26.

‡ Strabo, lib. xvi. c. 1; Plin. lib. vi. c. 27; Polyb. lib. v. c. 5; Dionys. Per. v. 1014.

§ Geograph. Vet. Min. p. 5.

|| Pasch. Chron. ed. Dindorf., vol. i. p. 730; Tacitus (Ann. lib. vi. c. 41) alludes to the same place under the name of *Halus*.

¶ See Asseman. Bib. Orient. tom. iii. p. 346; tom. iv. p. 753.

to Media, and sometimes to Assyria,* and we are thus able to explain the dominion of Shalmaneser, the Assyrian king, over the cities of Media. Some of the Christian Arabs, in their histories, directly translate the Halah of the captivity by Holwán.† Jewish traditions abound in this part of the country, and David is still regarded by the tribes as their great tutelar prophet. If the Samaritan captives can be supposed to have retained to the present day any distinct individuality of character, perhaps the Kalhur tribe has the best claim to be regarded as their descendants. The Kalhurs, who are believed to have inhabited, from the remotest antiquity, these regions around Mount Zagros, preserve in their name the title of Calah. They state themselves to be descended from Rohám,‡ or Nebuchadnezzar, the conqueror of the Jews; perhaps an obscure tradition of their real origin. They have many Jewish names amongst them, and, above all, their general physiognomy is strongly indicative of an Israelitish descent. The I'liyát of this tribe now mostly profess Mohammedanism; but a part of them, together with the Gúráns, who acknowledge themselves to be an offset of the Kalhurs, and most of the other tribes of the neighbourhood, are still of the 'Alí-Iláhí persuasion—a faith which bears evident marks of Judaism, singularly amalgamated with Sabæan, Christian, and Mohammedan legends. The tomb of Bábá Yádgár, in the pass of Zardah, is their holy place; and this, at the time of the Arab invasion of Persia, was regarded as the abode of Elias.§ The 'Alí-Iláhís believe in a series of successive incarnations of the godhead, amounting to a thousand and one—Benjamin, Moses, Elias, David, Jesus Christ, 'Alí, and his tutor Salmán, a joint development, the Imám Huseïn, and the Haft-tan (the seven bodies), are considered the chief of these incarnations: the Haft-tan were seven Pírs, or spiritual guides, who lived in the early ages of Islám, and each, worshipped as the Deity, is an object of adoration in some particular part of Kurdistán—Bábá Yádgár was one of these. The whole of the incarnations are thus regarded as one and the same person, the bodily form of the Divine manifestation being alone changed; but the most perfect development is supposed to have taken place in the persons of Benjamin, David, and 'Alí.

The Spanish Jew, Benjamin of Tudela, seems to have considered the whole of these 'Alí-Iláhís as Jews, and it is possible that in his time their faith may have been less corrupted. His

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* Strabo, pp. 524, 736, 745.

† See Chron. Orient. translated by Abr. Echell, p. 25.

‡ Rohám, who is considered by most oriental writers identical with Bukhtu-n-Nasr, was the son of *Gudarz*, and brother of *Giv*. He is sometimes, however, confounded with Gudarz himself. See D'Herbelot in the titles Rohám and Gudarz.

§ See D'Herbelot in the titles Holwán and Zerib Bar Elia.

mountains of Hhuphthon, where he places a hundred synagogues, are evidently Zagros; the name being borrowed from the Haft-tan of the 'Alí-Iláhís; and he states himself to have found some 50,000 families of Jews in the neighbourhood. Amaria, also, where the false Messias, David Elroi, appeared, with whose story the English reader is now familiar, was certainly in the district of Holwán. I am not quite sure from whence Benjamin derived this name Amaria; but there are some circumstances which lead me to believe the district of Holwán to have been called at one time 'Amráníyah; and the geographical indications will suit no other place. I must suppress, however, any further remarks on this very interesting subject of the identification of Holwán with the Halah of the captivity, and proceed to give some account of the antiquities which still exist there.

A long, narrow, rocky ridge extends from the mountain of Zagros westerly into the plain, bounding the district of Bíshíwah to the S. Towards its western extremity, and 10 miles distant from the foot of Zagros, it is cleft by two narrow gorges about 2 miles asunder; the most westerly of these, through which flows the river of Holwán, forms a sort of gigantic portal to the city. Here, upon either side of the river, are tablets sculptured on the rock, two on the right bank and one on the left; the execution is most rude, and they are now nearly obliterated, yet sufficient is still visible of their design to denote with certainty a Sásánian origin. Upon rounding the gorge to the left, two other tablets are discovered, sculptured one over the other upon the face of the rock, which has been smoothed with the chisel for the purpose, to the height of about 50 feet. The lower is of the rudest possible description, and represents two figures, one on horseback and the other on foot, with a few lines of inscription on either side, in a character which is certainly Pehleví, but which is so different from any of the other various alphabets of that language that I am acquainted with, and is, at the same time, so very nearly obliterated, that I have failed to decipher the name of the king in whose honour it doubtless was executed.

The bas-relief above this Sásánian tablet is in a bold and well-executed style, and is immediately recognised, by one conversant with Persian antiquities, as a work of the Kayánian monarchs. It represents a figure in a short tunic and round cap, armed, with a shield upon his left arm, and a club resting upon the ground in his right, who tramples with his left foot upon a prostrate enemy; a prisoner with his hands bound behind him, equal in stature to the victor king, stands in front of him, and in the background are four naked figures kneeling in a suppliant posture, and of a less size, to represent the followers of the captive monarch; the platform upon which this group is disposed is sup-

ported on the heads and hands of a row of pigmy figures, in the same manner as we see at the royal tombs of Persepolis. The face of the tablet has been much injured by the oozing of water from the rock, but the execution is good, and evidently of the same age as the sculptures of Bísutún and Persepolis.

The river issuing from the gorge appears to have bisected the town. On the right bank, at the distance of 1½ mile from the gorge, a wall has been thrown across to the rocky ridge, which on the northern side of the town forms a natural barrier of stupendous strength. This wall appears now only as a line of broken mounds, like the buildings of Nineveh and Babylon, and I conclude it, therefore, to have been a work of the Chaldean ages. Just beyond the wall, at the north-western angle of the city, and situated above a fountain which issues from the foot of the rocky ridge, are the remains of a Sásánian building, which may have been a palace, or a fire-temple: the place is called Kará Bolák* (the black spring), from the sulphureous spring issuing at its foot. On the left bank of the river the wall is not to be traced; but there are a vast assemblage of mounds which appear to mark the site of the principal edifices of the city. One of these is full 50 feet in height, and in several places around it brickwork is exposed to view, of the peculiar character of the Babylonian building. About 1 mile to the S.E. of this tapah,† and apparently beyond the limits of the city, are the remains of an edifice which I believe to have been a fire-temple of the Magi: the place is called Bághi-Mínījah,‡ and a hot spring issues from the foot of a mound adjoining it. But the most curious monument of Holwán is found at the corner of the upper gorge, about 2 miles distant from the sculptures that I have already described—this is a royal sepulchre excavated in the rock, precisely similar in character to the tombs of Persepolis. The face of the rock has been artificially scarped to the height of 70 feet, and at that elevation has been excavated a quadrangular recess, 6 feet deep, 8 feet high, and 30 wide; in the centre of the recess is the opening into the tomb, which, as in the case of the sepulchres of Persepolis, appears to have been forcibly broken in;—the interior is rude, containing on the left-hand side the place for the deposit of the dead, being a section of the cave divided off by a low partition about 2 feet high;—there are niches, as usual, for lights, but no sculpture nor ornament of any kind. Outside are the remains

* Bolák (thus spelt for Búlák, as in the name of Old Caïro, is probably the right spelling), though not in Meninski, is a Turkí or Chaghatái word, as appears from Eversmann's Tátár Vocabulary, p. 12. F.S.

† A Turkish word, "a mound or tumulus," written depeh and pronounced tepeh at Constantinople. F.S.

‡ The garden of Mínījah. Mínījah is one of the fabulous heroines of the Sháhnámah.

of two broken pillars, which have been formed out of the solid rock on either side of the entrance; the base and a small piece of either shaft appear below, and the capitals adhere to the roof of the recess, the centre part of each column having been destroyed. Upon the smooth face of the rock, below the cave, is an unfinished tablet. The figure of a Múbid, or high-priest of the Magi, appears standing with one hand raised, in the act of benediction, and the other grasping a scroll, which I conclude to represent the sacred leaves of the Zand-A'vestá; he is clothed in his pontifical robes, and wears the square pointed cap, and lappets covering his mouth, which are described by Hyde as the most ancient dress of the priests of Zoroaster.* There is a vacant space in the tablet, apparently intended for the fire-altar, which we usually see sculptured, before the priest. This tomb is named the Dukkáni-Dáúd, or David's shop; for the Jewish monarch is believed by the 'Alí-Iláhís to follow the calling of a smith: the broken shafts are called his anvils, and the part of the tomb which is divided off, as I have mentioned, by the low partition, is supposed to be a reservoir to contain the water which he uses to temper his metal. David is really believed by the 'Alí-Iláhís to dwell here, although invisible, and the smithy is consequently regarded by them as a place of extreme sanctity. I never passed by the tomb without seeing the remains of a bleeding sacrifice, and the 'Alí-Iláhís, who come here on pilgrimage from all parts of Kurdistán, will prostrate themselves on the ground, and make the most profound reverence immediately that they come in sight of the holy spot. In connexion with the Samaritan captivity, I regard this superstitious veneration for David, and the offering of Kurbáns, or sacrifices, at his supposed shrine, as a very curious subject.

There are several other Sásánian ruins in this neighbourhood, but they do not merit particular attention. The Kal'ahi-Kuhnah, or old fort, about 2 miles S.E. of the Dukkáni-Dáúd, resembles a large caravanserai, with a fortalice in the centre; and about a farsakh beyond this, in the same direction, is a high mound called Tapahi Anúshíraván, where the Kalhur chiefs have erected a modern fort, named Kal'ah Sháhín,† which has now given its title to the entire district.

The high-road from Baghdád to Kirmánsháh passes through the gorge which contains the sculptured tablets, and subsequently traverses the whole extent of the ruins—so that they must have already been subjected to the observation of many travellers; and it is thus most extraordinary that Zoháb should have been allowed to the present day to disfigure our maps as the representative of Holwán. The bridge across the river, and the two caravanserais,

* See Hyde de Rel. Vet. Pers. p. 369. † The royal fort.

which form the halting-place for travellers by this route, are in the middle of the ruins. The river is now generally named by the ignorant Kurds A'bi-Elwand, the Elwan of Rich; but this is a mere corruption from Holwán, and I have ventured, therefore, to restore the true orthography. There can be no question, I must observe, at the same time, about Sar-Púli-Zoháb being the real site of Holwán. The oriental itineraries and geographical notices are quite decisive upon this point, the ruins themselves bear certain evidence, and the spot is still known to some of the Kurds by the very title of Shahri-Holwán.* Holwán continued a great and populous town long after the Arab invasion of Persia. It was often partially destroyed in the conflicts of the Abbaside Khaliphate; but it again rose from its ruins, and it was not until the visit of the desolating hordes of Hulákú, in their descent upon Baghdád in A.D. 1258, that it received its final blow, and sank before the exterminating hand of war, never to be again inhabited.

Having now given a description of Zoháb, and the adjacent district, I proceed with a journal of my route from that place to Susiana.

Feb. 14*th*, 1836.—I left the caravanserai of Sar-Púli-Zoháb, or simply Sar-Púl, as it is often called, and marched with the Gúrán regiment 10 miles to Deirá, in a general direction of due S. Leaving the plain of Holwán, the road winds round the foot of a range of hills called Danáwish, into a little valley watered by the Deirá river, and from thence follows the right bank of the stream into the Sahrái-Deirá (plain of Deirá). This stream, in general a mere brawling rivulet, had been swollen by the recent rains to a furious and rapid torrent. The bridges of woven boughs, which had been thrown across in several places, from bank to bank, to afford a passage in case the fords should be impracticable, had been all swept away by the rise of the waters, and I was obliged, therefore, to encamp the troops on the right bank of the river. The A'bi-Deirá joins the Holwán river at a place called Mullá Ya'kúb, about midway between Sar-Púl and Kasri-Shírín, and it is said to be spanned near this spot by a natural arch of rock, which is called Púli-Khudá, or God's bridge. In the narrow valley which opens into the plain of Deirá are the winter pasture-grounds of the Kirmánsháh stud. The spot was selected by Mohammed 'Alí Mírzá, as well on account of its excellent herbage as for the security of the position shut in between the hills on one side, and the river on the other. In his time there were 500 brood mares kept in the Deirá valley; and the Kirmánsháh horses were renowned through Persia. When I passed there were scarcely a hundred mares, and they were all of a very inferior description. The plain of

* The city of Holwán.

Deïrá is about 4 miles in length, and 2 in breadth. It was formerly included in the páshálik of Zoháb; but after the conquest of that district by the Persians it was purchased, together with the rich territory of Kal'ah Sháhín by the Kalhur chiefs, from the Turkish owners, for a sum scarcely exceeding a single year's produce of the lands. There are 150 resident Kalhúr families at Deïrá, Dih-Nishíns (sitters in villages), as they are called; and it also affords kíshlak, or winter quarters for 400 more, who are nomadic. Near the place of our encampment, along the skirts of the range of Danáwish, were the ruins of an ancient town of considerable extent. The style of building, as far as it was visible in the foundations of the walls, appeared superior to the rude architecture of the Sásánian ages. Indeed there was so much of regularity in the construction of the buildings that I could not help fancying the ruins might possibly represent one of the towns which Alexander built in this vicinity, to command the passes, after he had succeeded in reducing the Cossæan mountaineers; especially as Deïrá stands upon one of the great lines of migration of the I'liyát; and in the hands of a conqueror must therefore have held them in complete subjection.* I am not aware, however, that it has been thought worthy of a place either in classical or oriental geography.

February 15*th*.—The river being still impassable, I was obliged to quit the high-road and follow up its right bank to the head of the Deïrá plain, where with some difficulty I at length brought the troops across. At this point there is a recess excavated in the face of the rock, which is called by the Kurds, U'táki-Ferhád (the chamber of Ferhád †). It would appear as though intended for the outer chamber of a tomb, like the Dukkáni-Dáúd; but it has been left in such an unfinished state that one cannot be positive as to its purpose.

From above Deïrá I traversed by a difficult pass, called Surkhah Mil (the red pass), the lofty and abrupt range of Sunbulah,‡ which bounds the plain of Gílán to the N.E. This is a very remarkable ridge of mountains, far exceeding in height all the other ranges, at the foot of the Zagros, in this vicinity, and exhibiting the same line of naked and precipitous crags, which appears with such imposing effect in the magnificent chain of Bísutún. The high-road from Zoháb to Gílán conducts across these hills by a more open pass, called the Tangi-Shishráh (the six-road-defile), from its branching into a number of parallel pathways, about a farsakh to the N. of Surkhah Mil; but even

* Diod. Sic. lib. xvii. c. 11.

† Most of the architectural curiosities in this part of the country are ascribed to Ferhád, the famous stone-cutter of Persian romance, who was enamoured of the beautiful Shírín.

‡ Pronounced Sumbulah; *n* becoming *m* before *b*.—F. S.

this track is not practicable to artillery; and I suspect therefore that the ancient royal route, which led along the line that I am now describing, must have rounded the extreme point of Sunbulah to the N. On the summit of the range there is a fine table-land, wooded with the dwarf oak, and bounded on either side with a barrier of rocky precipices, which is celebrated throughout the province for the abundance of wild animals that frequent it. This mountain, therefore, I have no scruple in identifying with the Sambulos of Tacitus,* near which, when Meherdates, under the auspices of Rome, invaded the Parthian kingdom, Gotarzes the Great was employed in offering sacrifices to the local deities, and among others to Hercules.

The classical reader will remember the story of the temple of Hercules in this vicinity, when the god was wont, like the wild huntsman of the Hartz, to scour the hills and forests with an invisible band, during the silent hours of night, and the priests, sallying forth at morn, collected the victims of the nocturnal chase. I doubt I must confess the application of the story to Hercules, as he was never regarded as a patron of the chase; and the evidence, moreover, of his ever having been worshipped in Persia is most meagre and unsatisfactory; but to whomever the tradition may belong, there is every reason for believing Sunbulah to be the scene referred to.

Gotarzes, we are told by Tacitus, retreated from mount Sambulos, behind the river Corma, to collect his forces, and there await the attack of his enemy. Meherdates was in Adiabene, and I suspect, therefore, that Gotarzes moved along the high Median road to the Kará sú,† the original name of which was preserved in the town of Kirmesín,‡ afterwards built upon its banks. In this view, the engagement must have taken place in the plain between Kirmánsháh and Bísutún; and I shall subsequently show the probability that Gotarzes immediately after the battle engraved a tablet and inscription at the latter place to commemorate his victory, of which the imperfect traces are still visible.

Descending from the heights of Sunbulah, the road conducts for 10 miles in a south-easterly direction, along the plain of Gílán, to a ruined village of the same name. The plain of Gílán is situated between the hills of Sunbulah and A'nárish. It is watered by a considerable stream, which joins the Holwán river, between Kasri-Shírín and Khánikín. There is much rice cultivated in this plain; and in the winter season it is covered over its whole extent with encampments of the Kalhur I'liyát. The village of

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* Ann. Lib. xii. c. 13. † Black-water.

‡ A city upon the banks of the Karású, from the ruins of which arose Kirmánsháh. This was not, however, another name for Kirmánsháh, as is sometimes stated, but a distinct city.

Gílán, which is situated at the southern extremity of the plain, on the lower road, conducting from Kirmánsháh to Baghdád, is now in ruins; the Kalhur chiefs, who usually pass the winter in this district, residing in black goats'-hair tents, which differ only in size from the abodes of the other I'líyát.

There are the remains of a considerable town at Gílán, similar in appearance to the ruins of Deïrá, and probably, therefore, of the same age. A very remarkable tapah is also found here, about 80 feet in height, and 300 paces in circumference. It is now crowned by a quadrangular fortification, with bastions at the corners, and at the foot of it is a large irregular fort; both of which defences are the modern works of the Kalhur rulers. The large sun-dried bricks of the Babylonian building are found in numbers at the tapah of Gílán, an unquestionable evidence of its antiquity; and I suspect it, therefore, to represent the site of a magnificent fire-temple of the magi, which, in the corrupted faith of the Arsacidan ages, being dedicated to some particular local divinity who was supposed to preside over the pleasures of the chase, became connected with the traditions that Tacitus improperly ascribed to Hercules.

I must observe that there are several circumstances referring to this temple and its vicinity which have an evident reference to the ancient superstitions of the country. The name of Sunbulah, which is applied to the mountains of the supposed scene of the nocturnal chase, signifies an ear of wheat; and this was the symbol of the female principle of the earth's fecundity, which, together with the male generative power of the sun, formed the two great objects of adoration among the early nations of the East. In after-ages the worship of the two principles, under the names of Mithra, or the Sun, and Anaïtis, or Venus, having undergone a great modification in its connexion with the theism of Zoroaster, became sometimes confounded; but still the Sunbulah, or ear of corn, continued the peculiar characteristic of Venus, in her personification of the fecundity of the earth; and thus we see it depicted on the coins of Nannaia (the mere Syrian translation of the Persian Anáhíd, or Venus*), which the labours of our countrymen in Bactria have lately brought to light.†

There is also a spring at the foot of the tapah surrounded with myrtle-bushes, which is held in great veneration. The sacred character of the myrtle (múrt, as it is called in Persia, from which was borrowed the Greek μύρτος) I believe to have originated in the East. Its connexion with the worship of Venus is well known; and it is a curious relic of the ancient observances,

* Náni is the Syriac name for Venus.—See Hyde, p. 92.

† See Journ. of the As. Soc. of Calcutta, vol. iii. p. 451.

that at the present day, wherever the myrtle-bush is found among the Kurdish mountains (and it is very rare), a sort of mystic reverence is attached to the spot, which the people are altogether unable to explain.

From the name of Sunbulah and the myrtle-spring, one would be inclined to believe this to have been a fire-temple, peculiarly dedicated to Anáhíd, or Venus; and at the same time, perhaps, the stories of the nocturnal chase may be explained, when we consider that the Grecian Diana, to whom the tradition will more properly apply, has been almost invariably confounded with the Persian Anaïtis, apparently from some resemblance between the Persian rites in their worship of the principle of fecundity, and the Grecian adoration of Diana in her character of Ilithyia, presiding over the labours of women.

I was met by the chief of the Kalhur tribe at some distance from Gílán, and conducted to his camp, where, surrounded by his relatives and followers, he held his little feudal court, in true I'liyát fashion. The Kalhurs are acknowledged to be one of the most ancient, if not the most ancient, of the tribes of Kurdistán. They number about 20,000 families, of which one-half are scattered over different parts of Persia, and the remainder still retain their ancient seats around Mount Zagros. These Kirmánsháh Kalhurs are again divided into two great branches, the Sháh-bázís and Mansúrís, the former numbering 8000, and the latter 2000 families.

The Sháh-bází Kalhurs possess the whole extent of country from Máhidasht, near Kirmánsháh, to the Turkish frontier at Mendállí.* The Mansúrí have rather a limited country, south of Gílán, which I shall presently describe.

Gílán has been laid down by Major Rennell, as the representative of the Bœotian colony of Celonæ, and has been adopted as such without farther discussion, in all subsequent maps; but this I believe to be incorrect; for the march of Alexander on Ecbatana, which suggested the verification, should be drawn from Susa instead of from Opis, as Major Rennell supposed; and it will be found upon this line that Celonæ was much too near to Susa to coincide with the position of Gílán. Neither does the route across Mount Zagros by Gílán appear ever to have been generally followed. The passes between Gílán and Hárún-ábád are very difficult; and the intervening country is very sparingly furnished with supplies; so that, had the march of Alexander commenced from Opis, he would certainly have followed the high-road by the gates of Zagros rather than this difficult and barren track. I find a solitary mention of Gílán

* Mendelí-Khánah in the 'Jihán-numá,' p. 466. F.S.

in oriental geography* as the source of the left branch of the Holwán river; and I conclude it, therefore, to have been a place of no consequence, since the establishment of Mohammedanism.

February 16*th*.—I left the Kalhur head-quarters, and made a long march of 8 farsakhs to Zarnah. The direct road from Gílán to the Luristán frontier passes over some high table-land, called Chillah; but, as this line was reported to be blocked up by the snow, I took the more circuitous route of the plain of I'wán. The road which I followed led from Gílán into a narrow valley between the mountains, called Miyán-dar (or mid-vale), which it pursued for 20 miles into the plain of I'wán. This glen was thickly wooded with the bellút, or dwarf-oak; and I found the trees here of a larger size than I have met with in any part of Persia. The herbage beneath them was of the richest and most plentiful description; and from this circumstance, together with its warm and sheltered position, the vale of Miyándar forms a favourite winter residence for the Kalhur I'liyát. Every little glade in the oak-forest was filled with their black tents; and their herds and flocks were grazing almost from one extremity of the valley to the other. The direction of the road through the valley was nearly S. On emerging into the plain of I'wán, the road struck across a barren track for 10 miles S. 20° E., to the village of Zarnah.

At Zarnah are found the ruins of a large city. There is a tapah, which I conceive to mark the site of the citadel, little inferior in size to the one at Gílán; and the foundations of buildings, now nearly levelled with the surface of the ground, extend over a space of perhaps 5 miles in circumference. Three or four detached buildings, in a state of less complete ruin than the rest, are met with in the vicinity of the tapah. They consist of the mass of narrow-vaulted passages, which appear to have constituted the places of abode in the era of the Sásánián kings; and the style of building being identical with that of the ruins at Bán Zardah and Kasri-Shírín, I have no hesitation in assigning them to the same epoch. The tapah, however, and the general mass of ruins, are certainly far more ancient. In the one are found the immense sun-dried bricks of the Kayánian age; and the massive character of the other indicates an era of the most remote antiquity. I'wán is distant 6 farsakhs S. 10° W. of Zarnah, at the extreme point of the plain; and the intervening country is rich and fertile, well watered, and almost entirely under cultivation. I'wán forms the head-quarters of the Mansúrí Kalhurs; but it is now only a small village; and, although the name signifies a palace, and would thus seem to denote an ancient

* See Nuz-hatu-l-Kulúb.—Pers. MS.

site, it does not possess, as far as I can learn, any ruins or other indications of former consequence. The Kalhur I'liyát of the plain of I'wán are all nomadic, with the exception of a few families resident at Zarnah and I'wán. They pass the winter in the plain, and move up during the summer to the yeïláks (summer residences) of the surrounding mountains. A stream, named the Gangír, rises in the lofty mountain of Mánisht, behind I'wán, and, flowing past the village, plentifully irrigates the extensive plain. Zarrah is about 2 miles distant from its right bank. From this point it diverges to the W., and, passing between the ranges of Anárish and Sarázúr, it flows on in a rapid and impetuous torrent to Saúmár, and from thence to Mendállí, where it is divided into a multitude of petty streams, and is totally absorbed in the irrigation of the rice-fields and date-groves. This stream I was at one time inclined to believe the representative of the ancient Gyndes; but a stricter scrutiny has obligcd me to concede the point in favour of the Diyálah. The circumstances which seemed to lend a colour to the identification were the similarity of the names of Gangír and Gyndes, the application of Mánisht to the Matienian mountains of Herodotus,* of the plain of Zarnah to the expression, διὰ Δαρνέων (the letters D and Z being used indifferently by the Kurds†), and finally the coincidence of its exhaustion at Mendállí with the labour of Cyrus, which divided it into 180 channels. The reasons that have induced me to decide against it are, that the Gangír could never have been a navigable stream; that its direction, to all appearance, would lead it to disembogue into the Diyálah, and not into the Tigris, if allowed to pursue its natural course; that it would not thus require to be crossed on the road from Sardis to Susa; that Cyrus would have had no occasion whatever to pass through Mendállí, in his transit from the Atropatenian Ecbatana to Babylon; and, lastly, that were the Gangír to be identified with the Gyndes, the broad and rapid stream of the Diyálah would be left without a representative.

The series of valleys which extend along the great chain of Zagros to the confines of Susiana, and are divided by a line of parallel ridges from the plains of Assyria, form one of the least-known, and at the same time one of the most interesting countries of the East. Here was the original seat of the Elamites, when they migrated from Babylon; and from hence they spread their conquests over Susiána, and the adjoining districts to the eastward, which thus assumed the title of Elymais. The Elymæans, are distinctly specified by Strabo, in numerous passages, as in-

* Book i. chap. 189.

† Probably *z* is substituted for *dh* by the Kurds, not for a radical *d: dhál* (*dh*) and *dhád* (*dh*) are pronounced by genuine Arabs as our *th* in *the, thou, that.*—F.S.

habiting along Mount Zagros, on the southern confines of Media, and overhanging Babylonia and Susiana. The most ancient name of the country appears to have been the plain of Arioch,* from whence the king of the Elymæans came to the assistance of the Assyrian monarch at Nineveh. His capital I believe to have been the very city of Zarnah, the ruins of which I have just described; for I have discovered that as late as the thirteenth century of Christ it actually retained the name of Ariyúhán.† I also suspect that this same place represents the Hara of the captivity,‡ which must certainly be looked for in this vicinity; and further, there can be no doubt that it is likewise identical with the Aarian of Benjamin of Tudela, where he states himself to have found 20,000 families of Jews.§ Before the age of Alexander the name of Arioch appears to have given way to that of Sabad, in the plural Sabadán; and with the territorial prefix of Máh, a country, Máh Sabad, and Máh-Sabadán. This, then, is the territory which is described by Strabo under the title of Massabatice, as one of the great divisions of Elymæa, intervening between Susiana and the districts around Mount Zagros,|| which is named by Pliny, Mesobatene, a district under Mount Cambalidos (probably the Sambulos of Tacitus), watered by the river Eulæus, before it descends into the plains of Susiana,¶ of which the inhabitants are called by Dionysius, Messabatæ,** and by Ptolemy, Sambatæ;†† and, lastly, which is referred to by Diodorus in his account of Alexander's march from Susa, under the designation of Sambana.‡‡ At the time of the conquest of Persia, by Ardeshír Bábegán, I find in a curious work a translation of a Pehleví chronicle,§§ that the province was called Máh Sabadán, the country of Sabadán, in the same way as are also mentioned Máh Niháwand and Máh Bastám, the countries of Niháwand and Bastám; and it is of much importance to be thus able to determine the true ancient signification, for the Arabs contracted the two words into Másabadhán (changing D into DH, according to the genius of the language), and pretended to refer the etymology to an epithet applying to the moon.|||| Bearing in mind that in the ancient language of Persia the *t* and *d* were used

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* Judith, i. 6.

† See Mu'jamu-l-Buldán and Murásidu-l-Ittilá.—Arab. MSS.

‡ 1 Chron. v. 26.

§ The *Ariyúhán* of Yákút, from whence a river flowed to Mendállí, or *Bandi-Najín*, as it was anciently called, can only represent *Zarnah-ú-l'wán*; and, as there are no ruins at the one, I conclude in favour of the other.

|| Strabo, pp. 524, 725.

¶ Pliny, book vi. c. 27.

** Dionys. Perieg. verse 1014.

†† Ptol. book vi. c. 1.

‡‡ Diod. Sic. book xvii. chap. 110.

§§ Translation of Ibn Mukaffa' in the Táríkhi-Tabaristán.—Pers. MS.

|||| Murásid-úl-Ittilá'.—Arab. MS. Máh in Persian signifies the moon as well as a country; and Yákút adopted the former meaning.

indifferently, that the addition of the cognate letter *m* before *b* is agreeable to the universal genius of orthography; and that the territorial prefix of Máh was sometimes employed and sometimes dropped, we shall be able to assure ourselves of the identity of all these names with as much satisfaction as we observe the exact accordance of their geographical indications.

The name of Másabadhán* will be familiar to the orientalist, for it is of most frequent occurrence in all the Arabian historians and geographers, and though it is now lost, there can be no difficulty whatever in defining the exact territory to which it applied. The district of Máh Sabadán appears to have commenced from the plain of I'wán, and to have extended along the face of the great mountains to the confines of Susiana. The route which I am now describing through this country, I may also observe, was a great line of communication in antiquity. It is described by Diodorus as "a royal road, conducting from Susiana into Media along the mountains, exposed to the heat, so circuitous as to extend the journey to nearly 40 marches; but in excellent order and well supplied with provisions," † an account which is minutely correct and cannot possibly be mistaken: it is the route which the same author has laid down in detailing the march of Alexander from Susa to Ecbatana, and his intermediate stations are all to be identified; it is again mentioned by Strabo as a great line of communication, traversing Massabaticé,‡ and leading into Susiana from the districts around Mount Zagros; and finally, Pliny also refers to it when he says, "that the most open and commodious passage from Susa, conducting into Bactria," (used in a general sense for the E. of Persia,) "lay through the province of Mesobatene."§ And we are able without any difficulty to explain the reason of this circuitous line of communication; for although in modern days, when there is no incumbrance to an army but the artillery carriages, strongly and massively constructed, several of the direct passes of the mountain-barrier of Zagros are to be traversed with difficulty; yet it was very different in an age when chariots formed a necessary accompaniment to an army, both for the services of war and the peaceful pageant of the king. In marching from Susa with wheeled carriages of that description, the direct line to Kirmánsháh, up the valley of the Kerkhah river, or to Khorram-ábád, along the course of the Káshghán,|| would have been both equally impracticable, and there would have been no shorter route conducting into Media

* There has been great confusion in the orthography of this word owing to the misplacing the diacritical points. See Reiske's Abúlfedá, vol. ii. p. 641. Abúlfedá's Geography determines the true orthography.

† Diod. Sic., book xix. chap. 2. ‡ Strabo, p. 725. § Book vi. c. 27.

|| The name of this river in the Nuz-hatu-l-Kulúb is written Kazhgí.

than the road along the plains of Máh Sabadán, at the foot of the great range to the gates of Zagros, where a single pass led across the mountain-barrier into the high table-land of Kirrind.

I now proceed with my route:—

February 17th.—I made to-day a very long and fatiguing march of 11 farsakhs from Zarnah to the plain of Chárdawer,* no single I'liyát encampment or other place from which supplies might be procured occurring between the two points. A lofty and extensive range of mountains, upon which the snow lay about a foot deep, intervenes between the plains of I'wán and A'smán-ábád. We crossed this from Zarnah in a direction nearly E., and on the descent of the mountains rejoined the high road from Gílán, which had traversed the elevated table-land of Chillah in a S.E. direction from that place: the Sahráï-A'smánábád is about 10 miles in length and 4 in breadth. It belongs to the Mansúrí Kalhur; but, as the plain of I'wán contains more arable land than the limited number of the tribe can cultivate, and A'smánábád, being more elevated, is less favourable to husbandry, it is made use of by them only as a Yeïlák, or summer pasturage. From A'smánábád to Chárdawer there are two roads; the one following the course of a petty stream which waters both these plains, the other through a richly-wooded glade among the hills; the former, the high road, is the nearest and the best; I preferred, however, the latter, as I feared that the troops might not be able to reach Chárdawer before night; and, in case of being obliged to bivouac, the sheltered position of the wooded valley would be far preferable to the exposure of the snowy plain. It turned out as I had conjectured. I contrived myself with a few horsemen to reach Chárdawer as it was growing dark; the troops, being overtaken by night, encamped in the glade. The plains of A'smánábád and Chárdawer form the frontier districts of Kirmánsháh and Luristán.

Luristán is divided into two provinces, Luri-Buzurg and Luri-Kuchuk, the greater and the less Luristán; the former is the mountainous country of the Bakhtiyárís, stretching from the frontiers of Fárs, westward, to the river of Dizfúl; the latter is situated between that river and the plains of Assyria, being bounded to the N. and S. by Kirmánsháh and Susiana.

This province of Luri-Kuchuk is again divided into two districts, Písh-kúh and Pushti-kúh, the country before and behind the mountains, referring, of course, to the great chain of Zagros; and Pushti-kúh thus represents the Másabadán of the geographers,† except that perhaps at present its northern frontier is

* Properly *Chahár-daúr* (surrounded on four sides), but always pronounced Chárdawer.

† The name of Másabadán is now unknown in the country.

somewhat curtailed. I entered this territory of Pushti-kúh at Chárdawer, a plain stretching N.W. and S.E. to an extent of about 12 miles in length and 5 in breadth, and alighted at the tent of Jemshíd Beg, the head of a tribe of Khizil* Kurds, who have been long located at Chárdawer and incorporated into the extensive tribe of Faïlí. I was much pleased with the frank and open demeanour of my host, so strikingly at variance with the mean and cringing courtesy of the Persians, and even, though in a less degree, of the Kirmánsháh Kurds. He welcomed me to his tent with every evidence of disinterested kindness, and seemed to tax his powers to the utmost to do honour to his Firingí guest. These black goats'-hair tents are of all sizes, from the petty cabin of the ra'yat to the spacious and commodious abode of the Hákim. The size of the tent is computed according to the number of poles, which often extend to 10 or 12, at the distance of about 20 feet from each other. A large apartment is thus formed, which is divided into a number of different chambers by means of matting; and the Díwán-Khánah, Anderún,† place for servants, kitchen, stable, and sheep-fold, are thus all included under the same roof. Around the Díwán-Khánah are spread coarse carpets of I'líyát manufacture, and in the centre is dug a deep square hole for the fire; in the tent of Jemshíd Beg the hole was filled with chips and logs of wood, and above were piled huge branches of trees to the height of several feet, and the mass of combustibles, when ignited, threw out, as may be supposed, such a heat, that it was with difficulty I could remain in the tent.

February 18*th*.—I halted to-day at Chárdawer, to enable the troops to come up and rest, after their very fatiguing march. I was in some apprehension at first; for there was blood between the Gúráns and the followers of Jemshíd Beg, the latter having joined the Kalhur tribe in their last foray on the Gúrán lands, and having lost several men in the skirmish which ensued. "Had they slain, however, a hundred of my men," said Jemshíd Beg, "they are your sacrifice; the Gúrán having come here under your shadow, they are all my guests;" and he insisted, accordingly, in furnishing the regiment with supplies, as a part of my own entertainment. Neither could I prevail on him to accept of any remuneration; he only requested that, in time of need, I would permit him to take *bast*‡ in my tent.

February 19*th*.—From the óbá§ of Jemshíd Beg I marched four farsakhs to Zangawán, where Ahmed Khán, one of the joint Wális of Pushti-kúh, held his temporary camp. The road led, for 12 miles, down the plain of Chárdawer, through an open

* A corruption, I fancy, from Khizr, the Muselmán name of Elias.
† The inner apartments for the women.
‡ Sanctuary.
§ An I'líyát encampment.

and well-cultivated country, to the Chármín Kúh (the white hills). At the foot of the hills we crossed the stream which waters the plains of A'smánábád and Chárdawer; and, at a short distance to our left, we saw it unite with a deep and rapid river, which here debouches from Zagros by a tremendous gorge, called the Tangi-Bábá Giriyyá. This was the river of Kirrind, which flows from that place to the plain of Hárúnábád, and there entering among the mountains, receives in its onward course the A'bi-Harásam and several other petty streams, until, swollen to a river of great force and rapidity, it bursts in a succession of terrific cataracts through the mountain of Wardalán, and emerges into the low country at the foot of the range. The ascent of the Chármín hills was most abrupt: at the summit was some extent of table-land, and the descent on the other side into the plain of Zangawán was equally precipitous. I heard of another route, at a short distance to the right, conducting over the hills by a very easy pass into the plain of Kárazán, and thence, following down a stream to Zangawán, which doubtless marks the line of the ancient road. Immediately on pitching my camp in the plain of Zangawán, A'hmed Khán, the joint Wálí of Pushti-kúh, came to call on me.

Between the 12th and the 17th centuries the province of Luri-Kuchuk was governed by a race of independent princes, who were named A'tábegs. The last prince of this royal race, Sháh-verdí Khán, was removed by Sháh 'Abbás the Great, and the government was granted to the chief of a rival tribe, Huseïn Khán, with almost unlimited authority, and with the title of Wálí in exchange for that of A'tábeg; his descendants have retained the title, which in Persia is almost equivalent to royalty,* and, though their power is now greatly weakened, they still affect a royal style in their manners and establishment. Owing to the intestine divisions of the family, Písh-kúh, which is by far the fairest portion of Luri-Kuchuk, has been wrested from them, and placed under the direct control of the Kirmánsháh government. Pushti-kúh, however, still acknowledges the sway of the Wálí; and, since the death of Mohammed 'Alí Mírzá, Hasan Khán, who had enjoyed this dignity, had yielded a mere nominal allegiance to the crown of Persia. Shortly before my visit, however, a breach had taken place in the family between Hasan Khán and his two eldest sons, and, the tribes being divided, the Kirmánsháh government had taken advantage of the moment to interfere, by supporting the sons against the father, and thus to establish a partial influence over the country. Hasan Khán therefore had been formally

* The title of Sháhinsháh, or king of kings, was assumed by the Persian monarch as lord paramount over four tributary princes, the Wális of Gurjistán (Georgia), Ardelán, Luristán, and Hawízah.

deposed, and 'Alí Khán and A'hmed Khán appointed joint Wálís in his place. The old man, for he is now upwards of ninety years of age, took refuge with a small body of adherents among the Arabs of the Assyrian plains, where, for some time, he baffled all the attacks of his enemies; and lately the I'liyát, finding that they alone were the party likely to suffer in the struggle between their rulers, and the consequent extension of the Persian authority over them, have obliged the father and sons to be reconciled; and Hasan Khán now again governs the territory of Púshti-kúh with the power and energy of an independent prince. When the whole of Luri-Kuchuk was under the dominion of the Wálís, all the tribes were included, under the general denomination of Faïlí, the peculiar title of Huseïn Khán's clan. At present, however, the inhabitants of Písh-kúh do not acknowledge the name in any way; they have a distinct classification of their own, and the title of Faïlí is applied alone to the tribes of Pushti-kúh, who are under the sway of the Wálí. The maps therefore are incorrect when they describe the whole of Luri-Kuchuk as "a mountainous country, inhabited by the Faïlí tribes."

I found A'hmed Khán a man of agreeable manners, and far better acquainted with the general state of eastern politics than I could possibly have expected. There was a tincture of bigotry, however, in his conversation, which forcibly reminded me of his being the representative, both in family and station, of the infamous Kalb 'Alí Khán, who murdered, for a conscientious refusal to pronounce the kalemah of Islám,* my unfortunate countrymen, Captains Grant and Fotheringham.† The family of the Wálí, indeed, are notorious for their intolerant spirit; and I should recommend any European traveller visiting the province of Pushti-kúh, in order to examine its remarkable antiquities, to appear in the meanest guise, and live entirely among the wandering I'liyát, who are mostly 'Alí Iláhís, and are equally ignorant and indifferent on all matters of religion. In my own case, of course, I had nothing to apprehend, as I was marching at the head of a regiment, and the rulers of the province were anxious to propitiate the favour of the prince of Kirmánsháh, in whose service I was known to be; but I saw enough on this journey, and upon subsequent occasions, of the extreme jealousy and intolerance of the Wálí's family, to feel assured that the attempt of an European to explore the country in an open and undisguised character, with any less efficient support, would be attended with the greatest danger.

A small stream at Zangawán forces its way through a chasm in the Chármín hills, and falls into the river which I have already

* "There is no God but God, and Mohammed is his prophet."
† See Malcolm's Persia, vol. ii. p. 438.

described, and which is here called the Abi-Sírwán. The chasm is named the Bandi Shamsháb; and in its precipitous face is a cavern only accessible by a ladder of ropes, in which are usually deposited the arms, stores, and treasures of the Faïlí tribe. Zangawán is, in consequence of this natural stronghold, and the fruitful and abundant character of the country around it, a favourite station for the encampment of the chieftain of Púshti-kúh.

February 20th.—This was a day of particular interest. My chief object in selecting this route had been to visit the far-famed ruins of the city of Sírwán; and to-day were my wishes gratified. I had been informed that the ruins lay upon the direct road, and did not think it worth while therefore to take a guide with me from Zangawán. After riding 10 miles, however, I learnt that the object of my search was a considerable distance to the right hand; and, the day being now far advanced, I had no alternative but to send on the troops to their place of encampment, and gallop across the country with a few horsemen to the ruins. I regretted this much afterwards, as I was prevented, by the smallness of my party, from examining the place with as much minuteness as I could have wished.

After crossing a range of low sand-hills, I reached a plain of limited extent, but excellently watered, and in the highest possible state of cultivation, which was called the Sahraï-Sírwán—every little eminence round the plain was crowned with ruins, whose rude though massive character bespoke the architecture of the Sásánian ages, and indicated the former populousness of the district. Whitewashed obelisks of brick-work, varying from 10 to 15 feet in height, were also to be seen in all directions upon the skirts of the hills, the sepulchral monuments of the Lurish chiefs. I inquired of a peasant the story of one of these, which, from its tall graceful form and recent erection, particularly attracted my notice. "A chief from Písh-kúh was betrothed," he said, "to the daughter of one of our Tushmáls;* he came to celebrate his nuptials, but sickened upon the road, and died before he reached the encampment of his bride. The maiden raised this pillar to his memory, and, shaving her long tresses, hung them round the obelisk in token of her grief." I found indeed most of the pillars thus decked with a coronal of woman's tresses, and learnt that it was a custom among the Lurish Iliyát, on the death of a chieftain, for all his female relations to cast off their hair, and hang their locks, woven into a funeral wreath, upon the tomb of their departed lord.

A narrow valley runs out westerly from the plain of Sírwán,

* Tushmál, in Lurish, signifies, like Kedkhudá in Persian, "the master of a house." The petty chiefs of Lúristán are all called Tushmáls.

piercing the hill of Kálarag, which forms a sort of outer barrier to the great chain of Milá-gáwan, and in this valley, upon the northern acclivity, are the ruins of the city.

The ruins of Sírwán are the most perfect remains of a Sásánian city in Persia. The buildings are uniformly composed of massive stone walls, cemented with a plaster of lime from the neighbouring hills, of the most extraordinary hardness and tenacity; a foundation of arched subterranean vaults appears universal, above which the usual construction seems to have been a single arched passage, divided into a number of apartments surrounding a quadrangular court; but, in other instances, the superstructure consists of a whole labyrinth of these vaulted passages, communicating with each other, the centre apartments being thus necessarily in a state of complete darkness, unless, indeed, of which I could perceive no trace, light was admitted from above. In a few cases, there were the remains of a second story, also arched, so that it would appear as if beams of wood were never made use of in these Sásánian buildings. Some of the houses were in a state of perfect preservation, the flowers and rude patterns upon the cement coating of the interior of the vaults appearing as fresh as if stamped but a few years ago. In the generality, however, the ends of the vaults had been broken in, which gave a most singular appearance to the side of the hill at a little distance, presenting to view nothing but lines of arched passages, as though the mountain itself were perforated with vaults.

One unusually extensive mass of ruins, overgrown with weeds and grass, was called the Kasr, or place of Anúshíraván; a hole in this mound, just large enough to admit of a man's body, which led into the labyrinth of subterranean vaults, was named the Dakhmah,* or grave of Anúshíraván, and was supposed to conduct to the place where that monarch's body was deposited† amid heaps of countless treasures. A talismanic tablet, engraven with unknown characters, was said to guard the entrance to the tomb, beyond which, if any one attempted to penetrate, he inevitably perished. Isma'íl Khán, a Faïlí chief, I was told by some of the peasantry who had joined my party, had come to the spot a few years before, determined to penetrate into the vaults; but the first man whom he sent into the Dakhmah had never returned, and the rest of the party were so alarmed at his fate that they could not be induced to creep in above a few yards from the entrance. From what I had seen of the intricate ramifications of the vaults exposed to view, in several of the other ruined buildings of far less extent, I could easily believe, without the intervention

* Dakhmah is the place where the Gebrs or Pársís exposed the corpses of their dead.

† Anúshíraván, we know, was in reality interred at Tús.

of a miracle, that the unfortunate man had been unable to regain the narrow aperture by which he entered, and had thus perished miserably in the subterranean labyrinth. The account, however, of the tablet engraved with unknown characters appeared so authentic, many of the peasants declaring that they had reached it, and describing exactly a large hewn stone covered with a long inscription, that I was very anxious, if possible, to examine it. Accordingly I was joining together ropes, bridle-reins, &c., to form a long line, when I heard an old white-beard behind me say—"I have not seen a Firingí since Kalb 'Alí Khán caught those two káfirs thirty years ago, and, sending them to Jahannam, divided their spoil among the tribe;" and, looking round, I saw that about 200 of as savage-looking beings as I ever beheld had swarmed out of the vaults, which they use as places of abode, and, having surrounded my little party, were evidently discussing the propriety of an attack. It would have been madness to have prolonged my stay among these ruffians, who make no more account of cutting a man's throat than a sheep's; so, pretending that I had not breakfasted, I directed them to prepare torches and a long rope, and told them I would take my breakfast on the banks of the little stream below the ruins, and return afterwards to penetrate into the Dakhmah. They appeared to believe me, and let me ride quietly down to the banks of the stream, from whence I trotted at a brisk pace out of the gorge, glad enough to be well quit of the neighbourhood, even at the price of being disappointed in seeing the talismanic tablet. I conceive the inscription, if it does exist, to be probably in the Pehleví language, as the ruins around are certainly Sásánian. The circumstance, however, which particularly excited my interest about it was the possibility of its being Greek, a relic of the Bœotian colony whom Xerxes transported to this spot;* for the town of Sírwán is now generally known among the Lurs by the title of Shahri-Keïlún; and, with this similitude of name, and the indication of 3 marches' distance from Sambana (Seïmarrah, the capital of Sabadán), there can be no difficulty in identifying it with the Celonæ of Diodorus, which Alexander visited in his march through this district, on his route from Susa to Ecbatana. Sírwán is also named by the Lúrs Shahri-Anúshíraván, that monarch being its reputed founder; and, indeed, as the present ruins are Sasanian, it would appear probable that Anúshíraván did really build Sírwán on the site of the old Grecian town.

The ruins within the gorge are of very limited extent, scarcely perhaps a mile in length; but the buildings are crowded together, more after the fashion of a European than an Oriental

* Diod. Sic., book xvii. c. 11.

town. Abú-l-fedá assimilates the situation of Sírwán to that of Mecca; being shut in between a hill and a river; and, from what I have read of the latter, I should think the resemblance correct. Quoting from another author, he also says that "there is a tomb here more holy than all others in the world, excepting that of Mohammed;" this I conceive to be the spot near Sírwán, which is now called, by the Lurs, the tomb of 'Abbás 'Alí, the brother of the Imáms Hasan and Huseïn, who in reality was interred at Kerbela; it is a place of great sanctity, and pilgrimages are made to it from all parts of Lúristán; 'Abbás 'Alí being regarded by the 'Alí Iláhis as the joint successor with his brothers of the incarnation of the divine principle, after the murder of his father. Sírwán is well described by all the Oriental geographers; and I cannot help regarding it as the river Vaanath of Benjamin of Tudela, distant two days' journey from Robadbar, and in which he found 4000 families of Jews; Nahrawán being a mistake of the Hebrew copyist for Sírwán, which was originally written.

I reached the place of encampment, distant 4 farsakhs from the ruins of Sírwán, soon after sunset; the tents were pitched on the banks of the broad and deep stream of the Abi-Sírwán, at the head of the district of Rúdbár,* which extends from hence along the valley of the river, a distance of about 6 farsakhs, to the point of its confluence with the Kerkhah. I heard at that spot of the ruins of a very considerable town, similar in appearance to Sírwán, which was called the Shahri-Rúdbár: † this would appear to be the Robadbar of Benjamin of Tudela, where he found 20,000 families of Jews; for the names are too nearly similar to allow us to attach much weight to his measurement (perhaps incorrect in the numbers) of 3 days' march from Susa. There is also a city mentioned in Oriental history under the name of el Rúd,‡ situated in this province of Másabadán, which was celebrated as the place of sepulture of the Khaliph Mehdí, one of the most magnificent of the house of 'Abbás; § and although the only measurement which I can find, referring to this place, does not exactly coincide with the position of Rúdbár,|| yet, from the similarity of name, and as I can hear of no other ruin in the district which may possibly apply, I am still inclined in favour of the identification. There are several stories related by the historians regarding the death of the Khaliph Mehdí, but the most probable seems to be, that he broke his back in pursuing an antelope

* Rúdbár is a name applied to many districts in Persia which lie along the banks of a river.

† City of Rúdbár. ‡ See Ibn Kuteibah Yákút, &c. § He died A.D. 784.

|| In the Marásid-u-l-Ittilá, the interval between Ariyúhán or Zarnhaand el Rúd is stated at 10 farsakhs; perhaps this may be an error for 20, the words being nearly similar in Arabic.

through the low door-way of a ruin whilst hunting in this district.* Of the site of the village of Rafaż, where the Khaliph had his summer hunting-place,† I have no indication. At the time when Yáḳút compiled his geographical lexicon,‡ about A.D. 1200, the traces of this tomb were hardly visible; and it is not surprising, therefore, that in the present day not only should the place of interment be unknown, but that the very legend of the illustrious dead should have altogether vanished.

February 21*st*.—From Rúdbár I marched 22 miles to the Saḥrá'i-Lort. The road rising from the bed of the Sírwán river traversed a range of hills, thickly wooded with the Belút, which divided the plain of Sírwán from the little valley of Bádrá'i. From the summit of these hills the magnificent range of Kebír-kúh first bursts upon the view, a sublime spectacle; the mountains, at this their north-western extremity, soaring up almost perpendicularly to a height which I suspect to be unequalled in the entire range. The peak of the hill, upon its northern face, was stated to be covered with perpetual snow; and this I do not believe to be the case with any other mountain, except the Kúhi-Mungasht, in the whole chain of Zagros, south of Zoháb. Two valleys, divided by a narrow range, and each watered by a petty stream, which falls into the Sírwán river, are successively passed on descending from the oak-wooded hills; they are named Bádrá'i and Kákágáwan. Another little chain is crossed beyond the stream of Kákágáwan, and the road from thence descends into the plain of Lort. I consider this space, intervening between Sírwán and Lort, to be the most difficult of transit upon the entire line between Zagros and Susiana; but still it is perfectly practicable to wheeled carriages. At the entrance of the plain of Lort is passed a spacious building, which is said to contain the body of Jábir Anṣár, one of the Aṣ-ḥáb, or companions of the prophet;§ though how this holy personage should have found his way into the centre of Lúristán is not attempted to be explained. The Saḥrá'i-Lort is covered with the cemeteries of Lúrish I'liyát, where I had occasion to observe the custom, which prevails throughout Persia, of representing symbolically upon the gravestone the sex, character, and occupation of the deceased, but nowhere so curiously and elaborately expressed as in these rude monuments of the Lúrish tribes. Thus, upon one tombstone, I remarked the following

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* See D'Herbelot, in the title Mahadi.

† See Táríkhi-Ṭabarí, Pers. MS.

‡ The Mu'jamu-l-Buldán. He afterwards condensed his great lexicon into a smaller compass, adding many particulars regarding the territory of Baghdád, and gave it the name of Muráṣidu-l-Iṭṭilá. My copy of the MS. states positively that the epitome, with its additions, was composed by Yaḳút himself. In Europe it is generally supposed to have been the work of Ibn 'Abdi-l-Ḥaḳḳ.

§ See D'Herbelot, in the title Giaber.

designs, all very rudely engraven, but still sufficiently marked to denote their true signification. First—a chief, attended by a few followers, shooting a lion that had fastened on the haunches of a deer; secondly—hounds pursuing in full chase a herd of antelopes; thirdly—a falconer flying his hawk at a partridge; fourthly—a company of horsemen, armed as if for a foray; fifthly—a band of women dancing the chupí;* and the elegy of glyphs was closed by a ring, a rosary, and a comb, toothed upon one side, such as is used by men in Persia; this last being the distinctive mark of the male sex; as the double-toothed comb is of the female. There were a multitude of other devices among the tombstones, some of them very curious, all of which I carefully noted, but have not time here to enumerate. The obelisks, and domes also, were uniformly decked with a wreath of woman's tresses, which, waving in the breeze, appeared to me a far more pleasing record of funereal grief than the fanciful devices of the sculptured slabs. The plain of Lort is of great extent, sloping down gradually to the valley of the Kerkhah river, but it is badly supplied with water, and therefore thinly inhabited by the Faïlí tribes.

February 22nd.—I moved on 20 miles, in a S. E. ½ S. direction, along the Sahráï-Lort, gradually descending all the way to the camp of Mírzá Buzurg, the governor of Písh-kúh, which was pitched in the plain of Seïmarrah, on the banks of the Kerkhah river. The plain of Seïmarrah is of great extent, stretching N.W. and S.E. about 40 miles, and varying from 5 to 10 miles in breadth, between Kebír-kúh and the Kerkhah. Geographically considered, it is included in Pushti-kúh; but Mohammed 'Alí Mírzá annexed it to Písh-kúh, and the Wális have never since been able to recover it. Lort and Seïmarrah now form the frontier districts. Seïmarrah is cultivated by about 300 families of the Amalah division of Písh-kúh; and it also affords winter pasturage to at least 1000 families from the other tribes of Lúristán. Mírzá Buzurg had left his camp to meet the prince at Jáïdar, whom I was also proceeding to join, but I was very hospitably entertained by his people.

February 23rd.—Sending on the troops to the bridge of Gámáshán, a distance of 3½ fersakhs, I rode across the plain, with a guide, in a S.W. direction, to the ruined city of Seïmarrah, which is usually called by the Lúrs, Darah Shahr, the city of the vale; or Shahri-Khusraú, the city of Khusraú† Parvíz. Seïmarrah is situated at the distance of about 8 miles in a direct line from the right bank of the Kerkhah, in a gorge of the mountains of Sheïkh Mákán, which form an outer rampart to Kebír Kúh; as, in the

* For a description of this dance see Rich's 'Kurdistan,' vol. i. p. 282.

† Chosroës of the Greeks. F. S.

case of Sírwán, Kálarág does to Milá-Gáwan. The locality of these two cities of Sírwán and Ṣeïmarrah is, indeed, singularly identical; and so precisely similar in character also are the ruins, that any description would be but a repetition of my former remarks. At Ṣeïmarrah, however, the ruins are somewhat more extensive, giving the idea of a city of greater consequence; and the direction of the streets and bazars, and the position of the káráván-seráis and principal edifices can be traced with greater accuracy than amid the ruins of Sírwán, where the buildings are so heaped together into a dense and confused mass, that a perception of their general design is unattainable. A fortress (of which the superstructure appears to be the work of later times), a large quadrangular enclosure (the Maïdán, probably, of the city), and a mass of building known by the name of Takhti-Khusraú (Khusraú's throne), are the principal ruins which attract observation. A massive wall, also, has been thrown across the jaws of the gorge, which must have rendered the position of the city, shut in on all other sides by natural defences of an almost insurmountable character, one of extreme strength and security. The reputed founder of Ṣeïmarrah, among the Lúrs, is Khusraú Parvíz. Innumerable traditions are current regarding the adventures of Shírín and Ferhád at this Kishlák, or winter residence of the Sasánian monarch; and a ruin is pointed out, among the rugged precipices south of the city, where Khusraú is said to have placed his queen, in jealous fear of the enamoured boldness of Ferhád, and the spot is still called Ḳasri-Shírín. Ṣeïmarrah appears to have been for a time the capital of the province of Másabadán. I regard it as the Sambana (a corruption of Sabadán) of Diodorus,* which Alexander passed on his route from Susa, three marches before reaching the Bœotian colony of Celōnæ (Sírwán or Keïlún). It would also appear to represent the strong fastness in the hills east of Ctesiphon to which Khusraú Parvíz sent his wives and children when the emperor Heraclius threatened his capital.† At the time of the Arab conquest of Persia it seems to have been named, indifferently, Ṣeïmarrah and Máh Sabadán; at least, the capture of the fort of Máh Sabadán, described by Ṭabarí, will only suit this place; and, in the other historians, the victory is usually denominated the conquest of Ṣeïmarrah. In the eighth or ninth century of Christ, Ṣeïmarrah sank before the rising greatness of Mihrgán Ḳudak; and, though it continues to be mentioned by all the Arabian geographers, it does not appear ever to have recovered much importance. At the commencement of the fourteenth century it was in ruins.‡

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* Diod. Sic., book xvii. chap. 110. † Theophanes, p. 269.
‡ See Nuzhat-u-l-Ḳulúb.

In a gorge of the hills, distant scarcely 2 miles south of Seïmarrah, are the remains of another city, precisely similar in appearance, as I have heard, to those of Seïmarrah: the place is called Tangi-Síkán; but I did not learn of the existence of the ruins until it was too late to visit them. Although I have no positive evidence upon the subject, I cannot doubt that these ruins represent the site of Mihrgán Kulak, the see, in the ninth century, of a Christian bishop, under the Nestorian metropolitan of Susiana.* The Arabians wrote the name Mihrján Kudhak; and seem to refer to the place as immediately contiguous to Seïmarrah, an indication which will suit no other spot but Tangi-Síkán. This is the town which, in our translation of Idrísí,† is named Mahargiafendec.

The bridge over the Kerkhah, named the Púli-Gámáshán, bears nearly E. of Seïmarrah, at the distance of 8 miles. An ancient bridge formerly existed here, called Púli-Khusraú; the remains of two buttresses are still visible, and I should regard them, from their appearance, as coeval with the building of the Sásánian cities of Sírwán and Seïmarrah. The bridge which at present crosses the river is one of the best I have seen in Persia. It was built by Huseïn Khání-Buzurg, the famous Wálí of Lúristán, in A.H. 1008, as is commemorated upon a small tablet built into the parapet. The river is here much contracted, and a single arch is thrown across the bed of the stream of about 80 feet in width. An arch of almost an equal span is necessary, however, to connect this with the right-hand bank; and, on the other side, a long line of smaller arches forms a sort of causeway along the shelving ground. The entire length of the bridge is 165 paces; and spacious rooms are constructed in all the buttresses, where, without much difficulty, I could have quartered the Gúrán regiment. The name of Gámáshán is a mere corruption of the title of the river in the early part of its course, where it is called Gámás, or Gámásh-áb, from the pretended representation of a cow (gá) and a fish (más) on the rock of Chihil-Nábálighán, above the spring of Chashmi-Kázim,‡ the real source of the Kerkhah.

February 24th.—From the Púli-Gámáshán I marched 4 farsakhs to Jáïdar: the direct road to Dizfúl, from the bridge, follows down the course of the Kerkhah to A'bi-Garm, distant 6 farsakhs; but I was obliged to deviate to Jáïdar, to join the prince's camp, and take command of the assembled troops. The Káshghán river joins the Kerkhah, or, as it is called in this

* See Assemanni, Bib. Orient., vol.ii. p. 460. † Idrísí, p. 199. A.D. 1600.
‡ In the Mu'jamu-l-Buldán it is stated that these figures are actually carved in the rock near Nihâwand; but I cannot discover that any such sculptures exist at the present day, though the story is still current. It is curious that many old coins should be found in Persia with this device of a bull and fish.

part of its course, the A'bi-Seïmarrah, and corruptedly Sadmarrah, about one mile above the Púli-Gámáshán; and the road runs along parallel to its course the whole way to Jáïdar; the track is extremely difficult, ascending, for about 2 farsakhs, a steep and rocky pass, which is barely practicable to loaded mules. From the summit of the mountains, which form the outer rampart of the chain of Zagros, the Káshghán river, on the left-hand, is seen at the depth of some thousand feet, foaming and struggling amid the most tremendous precipices, as it forces its way through the range, and descends in a succession of magnificent cataracts into the valley of the Kerkhah. The crown of the hill has been enclosed with a double line of wall, to command the pass; and were these old walls, although in ruins, to be defended with any firmness, at the present day, I consider that the pass is not to be forced. On descending gradually from the range, the open country of Jáïdar is entered—a plain, considerably elevated above the valley of the Kerkhah, but still much lower than the high table-land beyond the ridges to the eastward. A considerable hamlet, called 'Amárat, is here passed; and, a short distance farther on, I reached the meadow-land along the banks of the river where the Kirmánsháh troops were encamped.

The situation of the camp was very striking, the tents being pitched along the left bank of the Káshghán, where the river debouches through a chasm in the hills into the plain of Jáïdar. The remains of a bridge are visible at this place, one of the most massive I have seen in Persia. It was situated in the very jaws of the gorge, and consisted of a single arch thrown across from rock to rock; the two buttresses now alone remain, jutting out into the water, and formed of such tremendous blocks of hewn stone, that, although exposed to the whole force of the current for perhaps fifteen centuries, not one has been removed from its place. It is called the Púli-Shápúr, or Púli-Dukhtar; and is ascribed to Shápúr, the second king of the Sásánian dynasty, although the Lúrs have also a love-story to explain its appellation of the Maiden's Bridge. I conceive it to be a work of the Sásánians, forming the thoroughfare from Bísutún and Kermánsháh to their favoured cities of Susiana. The Káshghán river spreads itself out immediately below the gorge, and, dividing into two arms, thus admits of being forded, except during a few months in the spring, when its waters are unusually swollen by the melting of the snows. At this time the stream, though very rapid, was not more than three feet deep; and the passage, therefore, of the troops and artillery, from Kermánsháh, was effected with some delay, but without any accident. The plain of Jáïdar is stated to be a perfect paradise in the spring, as well from its verdant herbage as from the quantities of wild flowers that enamel its

surface. It is cultivated by some 300 families of Deh-Nishíns of the 'Amalah division of Písh-kúh; and also affords winter pasture to the great tribe of Hasanáwand.

February 28th.—After halting three days at Jáïdar we struck our camp and marched 4 farsakhs to A'bi-Garm; the first 2 farsakhs were along the table-land at the top of the hills, through an open country, which is all included under the name of Jáïdar. At the pass which conducts down the hills into the valley of the Kerkhah we joined the high-road conducting from Dizfúl to Khorram-ábád. From this point to the plain of Khorram-ábád, a distance of about 20 farsakhs, the country is very mountainous and difficult; but still it is practicable to artillery, and forms the usual route by which the governor of Kirmánsháh marches upon Khúzistán. The tract of country at the top of the hills is very desolate and barren, and is therefore called the Chul, or desert of Jáïdar: and a spot is also shown which is believed by the Lúrs to mark the site of Sodom, being called Shahri-Lút* (Lot's city). We now began to descend the range which I had already crossed between the Kerkhah and Jáïdar; and though the pass of Chuli-Jáïdar is considered to be easiest in the entire chain, which, as may be seen on a reference to the map, extends from Sunbulah to Dizfúl, yet it was not without great delay and difficulty that we succeeded in getting down the guns. A company of pioneers, however, might make a good road of the pass in a few days. From the foot of the hills, another farsakh brought us across an undulating plain to our encamping-place, on the banks of the little stream of A'bi-Garm, near the point of its confluence with the Kerkhah. The direction of our march from the camp at Jáïdar was due S.

February 29th.—We this day marched 7 farsakhs, along the banks of the Kerkhah, to Púli-tang, the great range of Káilún running parallel to our route, upon the left hand, and throwing out detached branches into the plain, at some points to the very banks of the river. The ancient high-road from Susa, through Máh Sabadán, led along the right bank of the Kerkhah, between Kebír-kúh and the river; and though the road we were now pursuing was far from difficult, yet the track upon the other bank seemed more open and commodious. The Púli-tang, or "Bridge of the Chasm," is a most remarkable spot; the broad stream of the Kerkhah, in general about 80 or 100 yards in width, here, for the space of 300 paces, forces its way through a narrow chasm, which a bold cragsman may spring across with ease; indeed I saw a young Kurd, on this occasion, leap across the river, to prove, as he said, that the feat was practicable; though it was

* A number of desert places in Persia are thus named Shahri-Lút.

rather nervous to look at him, for the crags were very slippery, and had he missed his footing he must have been dashed to pieces. The cleft is now about 150 feet in depth; the sides are honeycombed in the most fantastic manner, as though the chasm had been gradually worn down in the rock by the action of the water; and the river boils and foams below, in its narrow bed, as we might fancy of Styx or Phlegethon. A little arch has been thrown across the cleft, which forms the great thoroughfare for the Lúrish I'liyát, in their passage between their summer pastures, near Khorram-ábád, and the warm plains beyond the Kerkhah, where they encamp in winter. It was by this bridge, I believe, that Antigonus passed the Kerkhah in his memorable retreat from Badaca across the mountains into Media. The short road, which is described by Diodorus as conducting from Susa into Media, through the mountains of the Cossæans, "difficult, narrow, precipitous, through a hostile tract, badly furnished with necessaries, but short and cool," * was of course the route up the valley of the Kerkhah to A'bi-Garm, and from thence across the mountains to Khorram-ábád; and this is also the track across Mount Charban, which measured, according to Pliny, between Susa and Ecbatana, 380 Roman miles, † a statement that is strictly accurate; but I doubt if Antigonus pursued this exact route in his retreat from Badaca, for, in the face of an enemy, he could scarcely have traversed, in nine days, the space of about 180 miles, intervening by the high-road between the ruins which I suppose to represent Badaca and the first inhabited region of Media, at Khorram-ábád. As he appears to have altogether slighted the power of the mountaineers, and the reported difficulties of the country, I conclude that he took the most direct route that would conduct him therefore from the Púli-tang to the pass of Kaïlún, and so on, through the heart of the mountains, along the road which I have laid down in my map; and which is still sometimes followed by travellers with light baggage. The distance along this road will correspond with his nine marches; and the place where he was in danger of losing his whole army will thus fall in with the position of the steep and precipitous defile of Kaïlún, which exactly answers to the description of Diodorus.

March 1*st.*—From Púli-tang to Kal'ahi-Rizá there are two roads, the one along the banks of the Kerkhah, and across a most precipitous range of low gypsum hills, which are impracticable even to a loaded mule; and the other making a considerable detour to the left, to cross the hills by an easy pass, and rejoining the other road at the ford of the A'bi-Zál. The A'bi-Zál is dis-

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* Diod. Sic., book xix. chap. 19. † Pliny, book vi. chap. 27.

tant 8 miles from the Púli-tang by the near road, and 15 by the circuitous track round the hills. It is an impetuous mountain-torrent, which rises high up in the fastnesses of Káli-Asped and Anárah-rúd, and, after a course of perhaps 50 miles, falls into the Kerkhah 3 miles below the point where it is here crossed, on the road to Dizfúl. I have collected all my memoranda regarding the Kerkhah, which some late geographers have doubted to be identical with the river of Kermánsháh, into a separate paper, and this must excuse the hasty notice which I give its tributaries; but still I cannot pass over the A'bi-Zál without endeavouring to rectify an error of nomenclature which has crept into all our maps, and thereby created the greatest confusion. The river of Dizfúl is now invariably called by our geographers the A'bi-Zál, but this is certainly incorrect; neither in any Oriental author nor among the inhabitants of Susiana do I find that such a title ever has been or is applied to it; and, what is not a little curious, I cannot help suspecting that the error, which has now grown universal, has arisen from a faulty passage in Petit de la Croix's translation of the History of Tímúr, where, in describing the march of the Tátár army from Khorram-ábád, he says, "Tímúr, in 11 days, arrived at the bridge over the river A'bi-Zál: *the town at the bridge is called Dizfúl.*" Not having Sharafu-d-dín at hand to refer to, I cannot say whether this clause, "*the town at the bridge is called Dizfúl,*" is a wrong translation, an interpolation in the text, which the learned Frenchman copied, or an error of the original historian. Khwándemír, however, who evidently drew his materials from Sharhud-dín, has no such statement; and the A'bi-Zál, to which he alludes in describing this march of Tímúr, is certainly the river of that name, which I passed between Jáïdar and Dizfúl. Mr. Long, in his 'Memoir on the Site of Susa,'* states that Colonel Chesney believed the A'bi-Zál to join the Kerkhah at Hawízah; and the instructions of that distinguished traveller to Major Estcourt, published in the Euphrates-papers, appear to imply the same opinion. But this idea, I cannot help thinking, has also arisen from the mistake regarding the name of A'bi-Zál. Colonel Chesney was doubtless informed in Susiana that the A'bi-Zál disembogues itself into the Kerkhah, as it really does; but the river to which his informant alluded, under this name, was quite distinct from the A'bi-Dizfúl, which Colonel Chesney intended to imply. The bridge over the A'bi-Zál, which Tímúr crossed, still exists; but the pathway along its banks to the bridge we found to be impassable to guns, and our artillery therefore was transported across the river, by a very difficult and dangerous ford, about

* Journal of the Geographical Society, vol. iii. p. 265.

1½ mile lower down. The bed of this stream is filled with immense masses of rock, brought down by the strength of the current from the neighbouring mountains; and the force of the water is at the same time so excessive that accidents frequently occur in crossing it. The water is salt, from the bed of gypsum, I suppose, which it traverses; it is, however, of the most pellucid clearness, from which it is said to derive its name of Zál, a contraction of the Arabic Zalál, signifying "pure."

Our place of encampment at Kal'ahi-Rizá, in a spacious plain of the same name, was distant one farsakh from the ford of the A'bi-Zál; and we had now bid adieu to the Kerkhah, which, from the point of confluence with that stream, pursues a direction nearly southerly, while we bent our steps S.E., towards Dizfúl. There is no encamping-place for I'liyát between Jáidar and the plain of Rizá; and even here there are not more than 100 families of Dirikáwands, who pasture their flocks in winter at the foot of the hills of Kirkí. From the bridge of the A'bi-Zál, the short road to Khorram-ábád strikes off to the Káilún pass, where it ascends the mountains; this track effects a saving of about 10 farsakhs in the distance between Dizfúl and Khorram-ábád, but it is so difficult that it is never attempted by Káfilahs; and not often even by travellers, if accompanied by baggage. The Kal-'ahi-Rizá is an old dilapidated fort, surrounded by the ruins of a small village. Kebír-kúh, ending in a peak, called Dumi-sháh, does not extend beyond this point.

March 2nd.—The Prince moved on seven farsakhs, to the river of Balád-rúd. As great delay had taken place in crossing the guns over the A'bi-Zál, and they did not reach the camp till midnight, I made a march with the troops of only 4½ farsakhs to the plain of Huseiní. We were now visibly opening into the low country of Khúzistán: the road, throughout this stage, was over a ground of soft gypsum, which afforded a very easy passage for the guns: there were two deep and broad ravines, however, called Dukhtar-wajíh (the beautiful maid), and Tiktikí (from the dropping of a small cascade), which cost us some trouble to cross. The plain of Huseiní contains the ruins of a small village, from which it derives its name.

March 3rd.—I rejoined the Prince at Balád rúd, making an easy march of 2½ farsakhs; the road was good throughout, leading along an open plain to the stream of Balád-rúd, where were the remains of a bridge of brick-work, apparently of no very ancient date. The A'bi-Balád-rúd rises in the hills of Mángerrah and Sháh-zádah Ahmed, and after a course of about forty miles, flows into the river of Dizfúl, a short distance below that town: it was at this time a mere rivulet, containing scarcely a foot's depth

of water, but when there is any heavy rain in the hills, it comes down in a torrent of tremendous force.

Some years ago, when the late Sháh of Persia was crossing this stream with a large body of troops, the torrent, or síláb, as it is called, came down suddenly, and at once swept off fifty horsemen, and the force was delayed for two days upon its banks, during which time it was impossible to cross from one side to the other. The bed of the A'b-i-Balád-rúd is covered with pebbles filled with little fossil shells: they are called Sangi-Birinj (the rice stone), from the resemblance of the fossil shells to grains of rice, and are in much request throughout Persia for the head of the Nárgíl pipe,* which is scarcely ever, indeed, composed of any thing else but this stone, set in silver. The Sangi-Birinj is also found in the river of Shuster,† but neither in such quantities nor of so good a quality, that is, so full of shells as at Balád-rúd, and I do not believe that it exists in any other river in Persia. A hill fort called the Kal'áhi-Tangawán, overhangs Balád-rúd, which has the appearance of great strength; but as it is very indifferently supplied with water, it is of no repute in the country.

March 4th.—From Balád-rúd the road winds round the low sand hills at the foot of the Kal'áhi-Tangawán, and then enters on the immense level flat of Susiana. The distance from Balád-rúd to Dizfúl is 6 farsakhs, across a plain covered with the most beautiful herbage, and which is called Sahráï-Lur. This plain is at present without water, and uncultivated; but the traces of old canals are to be seen traversing it in all directions, indications of its former fertility. The village of Sálih-ábád, containing about 100 houses, and defended by a mud wall, is passed at the distance of 2 farsakhs from Dizfúl; it is watered by a small kanát,‡ brought from the hills, and is surrounded by a limited extent of cultivation. There are a few mounds, and other remains of old buildings at Sálih-ábád, representing, probably, the Lur, or Biládu-l-Lur, of the oriental geographers, which is laid down by them at the distance of 2 farsakhs from Andámish. Owing to an ignorance of the line of route, Lúr has been generally placed in the maps upon the Dizfúl river: some modern geographers, even, have supposed that the ruins of the ancient capital of Luristán might be found here,§ but from the appearance of the remains, I should conjecture Lur to have been a mere village, colonised from the neighbouring mountains: it seems, however, to have given its

* The Nárgíl pipe is that in which the cocoa-nut is used, instead of the usual glass bowl.

† I write the name Shuster, as it is now commonly sounded—we find it in books written in a number of different ways,

‡ A subterraneous canal.

§ Williams on the Geography of Ancient Asia, p. 238.

name to the surrounding plain, which, as I have stated, is still called Ṣahrăï-Lur.

We pitched our camp round the Burj, or tower, erected by Moḥammed A'lí Mírzá, on the right bank of the river, without entering the town. Dizfúl has been often described; it is now the chief city of Khúzistán, and may contain about 20,000 inhabitants.. The river of Dizfúl is laid down with sufficient accuracy in Kinneir's map; it is formed of two branches, which rise in the territory of Burú-jird, and uniting at Bahreïn,* pass into the mountains between the hills of Ushturán Kúh† to the right, and Miyánah Kúh‡ to the left. The passage of the river through the mountains, from this point to the plain of Dizfúl, is along, perhaps the most elevated and precipitous line in the whole range: it forces its way through a succession of chasms and gorges, and the track along its bank is utterly impracticable: indeed, this part of the range of Zagros is so very precipitous that there is only one single pathway conducting across it, from Dizfúl to Burú-jird. I have laid down the line of this track in my map, but I must observe, that it is only followed by the Bakhtiyárí-I'liyát, on foot, in their annual migrations: it is not to be traversed by a horseman, and is considered the most difficult of all the mountain pathways. The river of Dizfúl breaks into the plain between the hill forts of Tangawán and Ḳal'ah-sháhí, and passing by the town of Dizfúl, joins the Kurán at Bandi-Ḳír.§ I believe this stream to be the Coprates, but I shall not discuss the very intricate subject of the rivers of Susiana, until I have finished my remarks on the positive geography of the province.

Dizfúl I consider to be a Sásánian town, founded at the same time as the bridge was built across the river to conduct to the new capitals of Jundi-Shápúr and Shuster. It was originally called Andámish,|| and seems to have retained this name till the thirteenth century: Ḥamdu-llah Mustaufí,¶ indeed, who wrote about A.D. 1325 is the earliest author in whom I find the name of Dizfúl. It is not very safe to trust the etymologies of the orientals; but the most probable derivation of Dizfúl, or Dizpúl, seems to be the bridge of Diz; which name, although signifying generally, a fort, is applied in particular to a most remarkable scarped rock, situated near the river,** about 30 miles N. of the present town, and still celebrated throughout Persia, as the

* "The two rivers."

† "Camel's hill," so called from its shape.

‡ "Middle hill," so called because it connects *Ushturán-Kúh* with *Kúhi-Zardah.*

§ Bitumen-dyke, so called from the stones being cemented with bitumen: it is an error to call this place Bandi-Kíl.

|| See Idrísí, Yákút, Jaïhání, &c.

¶ Author of the Núzhatú-l-Ḳulúb.

** I suppose the river to have been called from the fort A'bi-Diz, or Nahri-Diz.

strongest hill-fort in the kingdom. Ra'nish was an old suburb of 'Andámish, on the right bank of the river, and the name still pertains to the ruins. I find it conjectured in a modern Persian manuscript,* that Dizfúl may represent the city of Antábulus, which is said in old authors to be met with near Sús, or Susa. I have never met with the name elsewhere, but, if it really did exist, it would seem more probable that it applied to Jundi-Shápúr, which was built, according to Abú-l-faraj, after the model of Constantinople, and may therefore have been called by that name by the Greek students in its schools, Antábulus being a corruption of the word Constantinopolis: this, however, is quite conjectural, and I very much doubt that such a city as Antábulus ever existed in Susiana.

March 9th.—After remaining five days at Dizfúl, I rode over to examine the ruins of Sús.† The road for 10 miles runs along the right bank of the Dizfúl river, which here makes a remarkable bend to the westward: the A'bi-Balád-rúd falls into it at the seventh mile. This part of the plain is covered with villages, and is well cultivated; being watered by canals, derived both from the river of Dizfúl and the Kerkhah: the great canal which conveys water from the latter is named Nahri-Hormasín,‡ and is said to be derived from a point about 4 farsakhs above Sús; and the remains of other water-courses, now unused, are to be seen intersecting the plain in all directions. At the tenth mile from Dizfúl, the river makes an abrupt turn to the S.E., and the road then leaves it, and stretches across the plain to the great mound of Sús, which is, from this point, distinctly visible on the horizon. As I approached the ruins, I was particularly struck with the extraordinary height of this mound, which is indeed so great, as to overpower all the other ruins in the vicinity. It forms the north-western extremity of a large irregular platform of mounds, which appear to have constituted the fort of the city, while the great tumulus represents the site of the inner citadel: by a rough calculation with the sextant, I found the height of the lower platform to be between 80 and 90 feet, and that of the great mound to be about 165 feet: the platform, which is square, I estimated to measure 2 miles and ½: the mound, which I paced, measured 1100 yards round the base, and 850 round the summit. The slope is very steep,—so steep indeed, as only to admit of ascent by two pathways. Upon the slope of the western face of the mound is a slab, with a cuneiform inscription of thirty-three lines in length engraved on it, and in the complicated character of

* Tazkarati-Shusteríyah, a work written by a native of Shuster about 100 years ago.

† In the country the name is now pronounced Shús, but in the Geographers it is always written Sús.

‡ For Hormuzein, *i. e.* the two Hormuzes? F.S.

the third column of the Persepolitan tablets: this is stated to have been a part of an obelisk, which existed not many years ago, erect upon the summit of the mound, and the broken fragments of the other parts of it are seen in the plain below. I saw three of the Babylonian sepulchral urns, imbedded firmly in the soil, at a point where a ravine had been recently formed by the rain, in the face of the mound: in another place was exposed to view a flooring of brickwork, a few feet below the surface, and the summit of the mound was thickly strewn with broken pottery, glazed tiles, and kiln-dried bricks. Beyond the elevated platform extend the ruins of the city, probably 6 or 7 miles in circumference: they present the same appearance of irregular mounds, covered with bricks, and broken pottery, and here and there the fragment of a shaft is seen projecting through the soil.

I had been very anxious, on visiting Sús, to obtain a correct copy of the famous bilingual inscription upon the black stone,* which was said to be preserved at the tomb of Daniel, and which had always appeared to me of the greatest importance to verify the recent discoveries regarding the cuneiform character: I was extremely disappointed, therefore, to find that this most precious relic no longer existed. It is well known that the inhabitants of Susiana attached the most profound reverence to this extraordinary stone, and fiercely resented any attempt to rob them of it, believing that the prosperity of the province depended upon its remaining in their hands. After the failure of Sir Robert Gordon to obtain possession of it, in 1812, it remained buried for some years to secure it from observation, but having been disinterred by the guardians of the tomb, it appears that in 1832 it was wantonly destroyed by a stranger Sayyid,† in the hope of discovering within it some hidden treasure: the whole story is very curious: the fragments (for it was blown to pieces with powder) were carefully collected, and reinterred within the precincts of the tomb; but immediately afterwards the province was almost depopulated by the plague: the bridge of Shuster suddenly broke, and the famous dam at Hawízah was carried away; all which disasters were, of course, ascribed to the destruction of the talisman: and as this Sayyid, also, was generally believed to have been a Firingí in disguise, I found the rancour against Europeans, in connexion with the black stone, bitter and extensive. The tomb of Daniel has been often described: it is a modern building, on the banks of the Shápúr river (or Sháwer, as it is generally called), immediately below the great mound: several bricks, stamped with arrow-headed characters, which have been brought from the ruins are built into it; in the court is preserved a capital of white marble, also brought from the great mound; and outside, on the

* See Ouseley's Travels, vol. i. p. 420.
† A descendant of Mohammed.

banks of the stream, are found two blocks, one covered with a mutilated cuneiform inscription, and the other sculptured with the figures of a man and two lions, which have been described by Sir W. Ouseley, from Capt. Monteith's relation.* To the N. of the ruins there are mounds and tapahs in all directions, among which are the Tali-Sulcïmán, Duwásí, and Gubá, and to the S. the plain is covered in the same manner, seven remarkable tumuli, near each other, being called Haft Chágán, and another very lofty mound Buláhíyah.

Near the tomb of Daniel is a ruined Imám Zádah,† two of the corners of which are based upon broken capitals, like that preserved in the court of the shrine, and under a Konár-tree‡ in the neighbourhood I perceived another of the same sort. I have thus noticed, I believe, all the relics of antiquity that are to be found at Sús; they are certainly less than might have been looked for, but they afford very satisfactory evidence of the site of an ancient capital of great extent. The river of Shápúr, to which I have alluded, rises about 10 miles N. of Sús: it flows in a deep narrow bed, by the tomb of Daniel, and laves the western face of the great mound. At this point are the remains of a bridge of no very ancient structure, and immediately below the bridge is a ford, by which alone, I was assured, from near its source to the point where it falls into the Kuran,§ in the neighbourhood of Weïs, can the A'bi-Shápúr be crossed: the water is considered by the Persians to be particularly heavy and unwholesome, and in this respect to bear a striking contrast to the Kerkhah, which flows at some distance to the W., and is believed to be little inferior to the Kuran in the lightness and excellence of its water. We are informed by the orientals,|| that when Abú Músá Ash'arí took possession of Sús, in the 17th year of the Hijrah, he dug a canal from this stream, and deposited in a grave at the bottom of it the coffin which was said to contain the bones of the prophet Daniel, and which was there held in great veneration, and afterwards letting the water into the artificial bed, effectually secured the grave from profanation. All authors, indeed, agree that the grave was in the bed of the stream, yet Benjamin of Tudela pretends, that in his day, the coffin was kept suspended over the river, to pacify the

* Ouseley's Travels, vol. i. p. 423.

† Sepulchral chapel in honour of a saint. F.S.

‡ Rhamnus Jujuba, or Lotus, F.S.

§ The name of this river has been hitherto always written Karoon: the true pronunciation which corresponds with the orthography is Kuran. [Kárún in Jehánnumá, p. 454. F.S.]

|| See Ashkálu-l-'A'lam (maps of the world) Arab MS. written by Abú-l-Kásim, Ibn Ahmed, El Jaïhání, in about A.H. 400, and translated into Persian by Alí-Ibn-'Abdu-l-Salám. This is the work, I believe, translated into English by Sir W. Ouseley under the title of Ibn Haukal's Geography. [That work is entitled 'Suwaru-l-Buldán,' a phrase synonymous with Ashkálu-l'álam. (Ouseley's Travels, vol. iii, p. 554.) F.S.]

Jews, upon either side, who were contending for the holy relic: but I have no space here to detail the numerous stories relative to this shrine. The A'bi-Shápúr is certainly not only navigable from Sús to the point of its junction with the Kuran, but from the facility which its deep and narrow bed, nearly level with the surface of the plain, affords for draught, is particularly suited to navigation. The river Kerkhah is distant 1½ mile from the great mound of Sús, and I could discover no trace of building in the interval between the rivers.

N.W. of Sús, and at the distance of about 2 miles from the right bank of the Kerkhah are some very extensive ruins, which are known by the name of I'wáni-Kerkh (the palace of Kerkh), or more generally simply I'wán, the palace. From the many descriptions which I have received, as well as from the view which I obtained of them with a large telescope, from the summit of the mound of Sús, I judge them to be Sásánian. The great ruin of I'wán appears to have been a palace, of the same style of building as the remains at Kasri-Shírin, Sírwán, and Semarrah. There are also said to be a few mounds, apparently of more ancient date; and a canal cut in the rock, which conducted water from the Kerkhah to the city is spoken of, moreover, as a very extraordinary work. The ruins of a bridge, which crossed the river, are to be seen opposite to I'wán; the place is called Pái Púl, or the foundation* of the bridge, the broken buttresses now alone remaining above the water. The ruins of Sús and the surrounding country are celebrated for their beautiful herbage: it was difficult to ride along the Shápúr for the luxuriant grass that clothed its banks; and all around, the plain was covered with a carpet of the richest verdure. The climate too, at this season, was singularly cool and pleasant, and I never remember to have passed a more delightful evening than in my little tent upon the summit of the great mound of Sús—alone, contemplating the wrecks of time that were strewed around me, and indulging in the dreams of by-gone ages. In the afternoon of the ensuing day I prepared to return to Dizfúl, which from the summit of the mound was distinctly visible, bearing N. 38. E. I proceeded in a direct line from the eastern extremity of the ruins to the river of Dizfúl, to determine its nearest proximity to the city, and I reached the bank at 6½ miles. From thence I galloped along the bank of the river, and got into the camp at dark.

March 13*th*.—We marched 4 farsakhs to Kuhnak. Crossing the river of Dizfúl, by a magnificent bridge of about 330 paces in length, we traversed the town, and entered on a well-cultivated plain to the eastward. At the distance of 2 farsakhs, we met with

* The foot of the bridge.

the village of Sháh-ábád, on our right, which I have no hesitation in identifying with Jundi-Shápúr. In my after residence at Dizfúl, I made frequent visits to this place, for the purpose of examining the remains; and, although the site of the ancient city has now been for many centuries under cultivation, and there is no single ruin, therefore, in any state of moderate preservation, yet the extensive lines of mounds, and the numerous foundations of massive walls, are quite sufficient to verify the measurements of the geographers,* which indicate this exact position. It is not to be denied that there are some difficulties attending the identification of Jundi-Shápúr, which arise from the blunders of certain Persian writers, who appear to have been ignorant of its true position; † but, after a review of all the evidence, I find no reason to doubt of its being represented by Sháh-ábád. Jundi-Shápúr appears to have been founded by the first Shápúr, after his victory over the Emperor Valerian. It was enlarged into a great city by his seventh successor, Shápúr Dhú-l-aktáf. During his reign (about A.D. 350), it became the see of a bishop of the Nestorian church,‡ which had been instituted in Susiana a century before, and, when Jundi-Shápúr soon afterwards rose to be the chief city of the province, the seat of the metropolitan, which had formerly been fixed at Ahwáz, or, as it is called by the Syrians, Beth Lapet, § was transferred to it. The school of Jundi-Shápúr was renowned, during the reign of Anúshíraván, through the East and West; || and the city continued, to the time of the Arab conquest, one of the great capitals of Susiana. It appears to have sunk before the rising greatness of Shuster, in the 13th century; and it is little mentioned in Oriental history after that time. Jundi-Shápur was watered by some magnificent aqueducts, excavated at an immense depth in the solid rock, and derived from the river of Dizfúl, about 5 miles above that town. The water, which still flows in them, is now employed in irrigating the rice-fields. The present inhabitants of Khúzistán are so grossly ignorant, that I scarcely met with an individual familiar with the name even of Jundi-Shápúr, and it was altogether in vain, therefore, to seek for oral information regarding its site. Sháh-ábád, however, is traditionally believed in the province to represent the City of the Seven Sleepers ¶—a story which, wherever it prevails in the East, may be received as an evidence of antiquity.

* The measurements usually given are, 8 farsakhs from *Shuster*, and 2 farsakhs from the bridge of *Andámish* or *Dizfúl*.

† Hamdu-llah Mustaúfí thus places *Jundi-Shápúr* on the river of Dizfúl.

‡ Asseman. Bib. Orient., tom. ii. p. 398; tom. iv. pp. 43, 44, and 421.

§ Asseman. Bib. Orient., tom. iv. p. 758.

|| See Gibbon, chap. xlii.

¶ See Tazkarati-Shusteríyah. The real City of the Seven Sleepers was *Ephesus*; but the story is attached traditionally to many other places in the East. See D'Herbelot, in Asbab-i-Kahaf.

At 2 farsakhs farther on, we reached our camp, near the ruined village of Kuhnak.

March 14th.—We continued our march 5 farsakhs, to the bank of the Kuran, over a plain of the richest soil, but perfectly uncultivated. A range of low sand-hills bounds the plain to the left, at a distance of about 2 farsakhs, and divides it from the hilly district of Sar Dasht, which stretches up to the foot of the great mountains. Upon the right was a vast level flat, as far as the eye could reach. A dry canal, which was derived from the Kuran, at the Bandi-Dukhtar, and formerly watered this tract of country, is passed, midway between Kuhnak and the river; a little ridge of sand-rock occurs, at the edge of the plain, and the road, crossing this, descends direct upon the river, the town of Shuster, which had been shut out from view by the ridge, appearing on the other side. The bridge of Shuster gave way at the rise of the waters in the winter of 1832; and, not having been repaired when I was there, we were obliged to bring the troops and guns across the river upon rafts, or kalaks, as they are called, supported on inflated skins. We pitched our camp along the pebbly beach, in the bed of the river; a most unsafe position, as a sudden rise of the waters would have swept it away bodily; but there was positively no other ground available. To the accounts of the city of Shuster itself, which have been already published, I have not much to add; but the very erroneous opinions which appear to exist regarding the river Kuran require to be rectified.

It would appear that Ardeshír Bábegán, or his son, Shápúr, after having founded Shuster, upon the left bank of the Kuran, in a bend of the river, excavated a deep and wide canal to the E. of the city, and thus divided the waters of the river. The artificial stream was derived from the Kuran, immediately above the town; and, defending it upon the eastern face, as the original bed did upon the western, it rendered the position one of extreme strength: but the city, situated on a rising ground, between the two arms, could have been but indifferently supplied with water, and a further undertaking, therefore, was necessary to remedy this defect. A massive band, or dyke, accordingly, was thrown across the original bed of the river, at the distance of about half-a-mile from the mouth of the canal, narrow outlets, or sluices, being left for the passage of a certain portion of the water. The consequence of this was, that the great body of the river was forced back into the artificial derivation. Another band was then thrown across the mouth of the canal, forming, as it were, a continuation of the line of the original bank, and raised precisely to the same height as the lower dyke. Here, too, the passage of the water was regulated by sluices; and the entire bed of the stream being now formed, as it were, into a vast reservoir, the mouth of a tunnel was opened into it, which had been excavated directly

through the hill of sand-rock forming the left bank of the river, between the two bands, and below the level of the water thus artificially elevated: a copious stream, of course, immediately flowed into the tunnel, and sufficient water was thus obtained for the supply of the town and the cultivation of a vast tract of country extending to the S. of it. Before either of the bands, however, were undertaken, and when the whole body of the river must have flowed in the artificial canal, the mouth of which had probably been deepened for the purpose, that part of the original bed between the two dykes which was intended to form the great reservoir was paved throughout with massive hewn stones, fastened with metal clamps, to prevent the further deepening of the river, and to give additional strength and security to the whole work.* Such, as far as I can gather from Oriental authors and a minute personal examination, has been the general design of the stupendous hydraulic works of Shuster. The course of the river has constantly changed as either of the dykes has given way and yielded a free passage to the waters, and, in that case, the level of the water in the great reservoir having fallen below the orifice of the tunnel, it has become, of course, altogether useless. When I was at Shuster a part of the lower band had given way, with the breaking of the bridge above it; and the level of the river having thus sunk several feet, the supply of water in the tunnel became reduced proportionably, and the lands S. of Shuster were thrown entirely out of cultivation. The band, however, has been since repaired; and I now understand that the tunnel, or Nahri-Dáriyán, as it is properly called, is quite full.

I must now explain the names and courses of these streams, which have been much confused by the Oriental geographers, and appear even to be scarcely understood at the present day. The artificial canal which now forms the left branch of the river is the famous Nahri Masrúkán of the Oriental geographers; it subsequently changed this title for Dú Dángah (two parts), owing to its forming the channel for about two-sixths of the water, while the other four-sixths flowed in the original bed; and it is now called *A'bi-Gargar*, from the name of the eastern mahulluh of Shuster, which it waters. Originally this canal was protracted to the vicinity of Ahwáz, and there entirely absorbed in irrigation. It traversed upon this line during the early ages of Islam the great city of 'Askari-Mukram, 8 farsakhs from Shuster; † to the site of which, however, I have been only able to obtain this approximate indication. Subsequently it would seem that the Bandi-

* In Kinneir's Map the courses of the river and canal are reversed. He makes the western branch the canal, and the eastern the river; whereas, the western, or right branch, is in reality the river, and the eastern, or left branch, the canal. It is curious how, after visiting Shuster himself, he could have fallen into such an error.

† With regard to the Nahri-Masrúkán, I have compared the accounts of Jaïhání, Idrísí, Yákút, Abú-l-fedá, Hamdu-llah, and the Tazkarati-Shusteriyah.

Kaïṣar must have given way, and that the great body of the river, flowing in the bed of the canal, had forced a passage into the old channel; for, at the commencement of the 13th century, we find the great river of Shuster, which rose near Isfahán, and disembogued into the Persian Gulf, named the Dujeïli Masrúkán. Again, the march of Tímúr, who crossed the Dú Dángah on the third march from Shuster towards Rám Hormuz,* is† not to be understood except on the supposition that at that time the course of the stream made a much greater deviation to the eastward than at present. Altogether, the elaboration of the Nahri-Masrúkán is one of the most intricate and contradictory objects of research that I was ever engaged upon. Col. Chesney followed up the modern line of the canal from Bandi-Ḳír to Shuster, and I need add nothing, therefore, regarding its present course. The dyke at its mouth is now named Bandi-Sháh-zádah, from its having been repaired by the late Prince of Kirmánsháh; it seems to have been anciently called Bandi-Kaïṣar. The original channel of the river which flows to the W. of Shuster is the Nahri-Tuster, or Dujeïli-Tuster, of the geographers; it is the Chahár Dángah of Tímúr's march, and, during the last two centuries, it has been named Kuran. When I was at Shuster, owing to the partial destruction of the band, the Kuran contained about four-fifths of the entire body of water; at present, I understand it is reduced about two-thirds. Many bands were formerly constructed upon this stream, to divert the waters into channels to the E. and W., but the Bandi-Khák,‡ immediately below the town, is the only one at present which fulfils its original purpose. The great dyke across the Kuran was named Bandi-Mízán, "the dyke of the balance," from its being carefully formed to the same level as the Bandi-Kaïṣar, and above the mouth of the tunnel. The bridge, which is called Púli-Kaïṣar ("Cæsar's Bridge," all these works being ascribed to Shápúr's prisoner Valerian), was built upon this dyke, the buttresses of the bridge forming a part of the band. The intervening space in the bed of the river between the two tunnels, which I have called the great reservoir, is the famous Shádarwán § of Shápúr, being so named from the stone pavement at the bottom of the river, which is said to be still in good preservation. This particular part of the river is also named, in some works, Náhri-Máh-páriyán. || It now remains that I should describe the tunnel. This is properly called the Nahri-Dáriyán, but is more generally known by the name of A'bi-Miyándáb (a contraction for Miyán-dú-áb, the river

* Muráṣidu-l Iṭṭilá'.

† Tímúr is stated to have left Shuster on April 17th, and, advancing rapidly, to have crossed the Dú Dángah on the 19th.—Petis de la Croix, ii. p. 183.

‡ The earth-dyke.

§ Shádarwán signifies a carpet or flooring.

|| The name is now corrupted into Máfáriyán.

between the two waters). It is a deep and narrow channel, cut directly through the hill upon which stands the castle of Shuster. The entire length of the excavation may be three hundred yards; the breadth is fifteen feet: in many places it is cut down, in a direct cleft through the hill, in others it is perforated like a tunnel; the mouth is in the face of the precipice, below the castle, and is said to be ten or twelve feet deep. I do not consider it a work of any great labour, even for Orientals, for the the rock is of a very soft and yielding quality. The Nahri-Dáriyán, where it issues from its excavated bed, flows in a channel, which seems to have been built with the greatest care, and of massive blocks of stone, immediately under the ruined walls of the western face of the town, and elevated, consequently, above the pebbly bed of the Kuran; petty aqueducts convey the water from hence to all parts of the town, and, when full, the canal is said to irrigate the whole district of Miyándáb, to the extent of 10 or 12 miles S. of Shuster.

Colonel Chesney has stated,* that the stream which unites with the eastern branch of the Kuran, at Bandi-Kír, is not the river of Dizfúl, but the western branch of the river of Shuster. It is, in reality, however, the united waters of the Dizfúl river, and the western, or main branch of the Kuran, which he observed to join the canal at that spot; the point of confluence of these two streams occurring a few miles to the N. of Bandi-Kír.†

There is no single ruin at Shuster, which can be referred with any certainty, to an era anterior to the Sásánian dynasty; but the excavated chambers in the rocks appear ancient, and if I might be allowed to hazard an identification, I would suggest it to represent the Sele of Ptolemy,‡ and Ammianus. §Sela',|| or Sele', signifies a rock, and the name seems to have been particularly applied to places like Petra,** and Shuster, where the early inhabitants lived in these excavated chambers. The castle also of Shuster, which is built upon a rock thus excavated, retains to the present day the same title of Silásil, which it possessed at the time of the Arab conquest. Ptolemy's geographical position of Sele, too, may be explained; and if Ammianus had any authority whatever for including this name in his list of the Susian cities, farther than the example of his model, Ptolemy, as all his other positions are to be identified, there will positively remain no representative for his Sele among the then existing cities of the

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* Journal of the Royal Geog. Soc., vol. iii. p. 265.

† I have never myself seen the point of confluence, but I derive my information from the most authentic sources, particularly from a tribe of Arabs, who dwell upon the very spot: there is no question at all upon this point among the inhabitants of Khúzistán.

‡ Ptol., book vi. chap. 3. § Amm. Marc., book xxiii. chap. 6.

|| Sela' is a Hebrew and Chaldee word, and could hardly have given rise to the Arabic plural *salásil*, i.e. chains. F.S.

** See Keith's Evidence of Prophecy, p. 187.

province; but either Ahwáz or Shuster: but I place no great dependence on these few points of coincidence, and merely offer the identification as conjectural.

M. Court has spoken of a bas-relief, and monogram, upon the gate of the castle of Shuster.* I cannot positively deny their existence, but can state that I have traversed all parts of the castle, expressly in search of ancient relics, and that no such sculptures ever fell under my observation; indeed, I consider that far too much importance has been attached to this building. I regard the edifice as quite modern, and do not believe that a fragment of the ancient castle of Shápúr now exists.

There is a deep and broad ditch running along the southern face of the city of Shuster, from one river to the other; and this, when the Nahri-Dáriyán has its proper supply of water, may be filled without any difficulty; Shuster will then form a complete island, and be a place of much strength. Beyond the ditch, at the distance of ¼ of a mile, there are some ruins which I regard as far more ancient than the city of Shuster itself; they merely now present to view a quadrangular enclosure of high mounds, about ¾ of a mile square; but from their great solidity, I judge them to mark the site of a town of the Babylonian ages—the line of the canal runs along their western face. They are believed by the Shústerís, but of course, erroneously, to denote the position of 'Askari-Mukram, and are named Lashkar, the Persian translation of 'Askar.† The southern gate of Shuster, through which did really lie the road to 'Askari-Mukram, is called Darwázahi-Lashkar;‡ and hence appears to have arisen the title of the ruins adjoining it. The city of Shuster was nearly depopulated by the plague in 1832, and it has never since recovered its importance: it may now contain about 15,000 inhabitants; but Dizfúl is considered the principal town of the province.

On the 23rd of March we moved from Shúster to march against the Bakhtiyárí fortress of Mungasht. The canal upon the eastern face of the town, now called A'bi-Gargar, is crossed by a bridge of a single arch, which, together with the massive band upon which it is built, are recent erections: the bridge is at the distance of about ¾ of a mile from the mouth of the canal; and the band has been merely formed to force the water into a number of little channels, excavated in the rock to the E. and W., for the purpose of turning mills: these streams all unite again at the foot of the band, and the collected waters appeared

* Journal of the Asiatic Soc. of Bengal. No. 35. p. 560.

† Lashkar in Persian and 'Askar in Arabic signify an army; *'Askari-Mukram* is said to have been so named from its originally forming the camp of a chief called Mukram. 'Askar Mukram, "the honoured host," was probably equivalent to the royal residence, the U'rdú, or court of the Moghals. F.S.

‡ The Gate of Lashkar; i.e. 'Askar Mukram.

to me about a fifth of the whole body of the river: the district to the E. of the bridge is named Boláïtí. It appears to have formed a suburb of the ancient city, and indeed, has only become wholly deserted within these last few years. I do not believe, however, that Shuster ever extended to the westward of the Kuran, as has been sometimes stated. At the distance of 2 miles from the bridge we passed a hillock, crowned with the ruins of an ancient edifice, which is named Takhti-Kaïsar (Cæsar's throne): the summit of the hill has been artificially levelled, and a palace of the Sásánians appears to have been built upon it: our road, in a general direction of S. 33. E. lay along the broad belt of low hills of sand-stone and gypsum, which extends along all this part of Zagros, between the mountains and the plain. The great range does not immediately overhang Shuster, as is generally believed; it lay at the distance of about 5 farsakhs on our left hand. There is now very little fresh water to be procured upon this line, but anciently it appears to have been better supplied; for the ruins of massive bands were visible in the beds of all the torrents and ravines which had been constructed to form reservoirs wherever a fit spot occurred. We encamped in the little plain of Píchistán, distant 11 miles from Shuster.

March 24th.—We made another easy march of 10 miles to a salt stream named Shúrish, the direction and character of the country being the same as yesterday. The stream of Shúrish rises in the gypsum hills, about 30 miles E. of this point; it flows through the extensive plain of Baïtáwand, to the left of the line of road upon this day's march, and falls into the Kuran, below 'Akílí, a large village, with a famous orange garden 4 farsakhs N. of Shuster. The plain of Baïtáwand, so called from one of the tribes of Luri-Buzurg, to whom it formerly belonged, contains some fresh water rivulets, and is one of the few cultivated districts in this part of the country. On one of these little streams there is a magnificent ruin, which I saw from a distance, but which, to my extreme regret, as we were now in an enemy's country, and I was obliged to be very cautious, I was unable to visit. It is named by the Lurs, Masjidi-Suleïmán, or sometimes Masjidi-Suleïmáni-Kuchuk,* to distinguish it from another ruin, named Masjidi-Suleïmáni-Buzurg,† which I shall hereafter speak of, and represents, without doubt, one of the ancient temples of Elymais.

March 25th.—We continued our march 12 miles to Shakar-A'b,‡ a rivulet of fresh water, crossing the salt water stream again near our halting-place. The road lay along a valley,

* The lesser mosque of Solomon. † The greater mosque of Solomon.
‡ The sugar stream.

between the sand-hills, covered with a profusion of wild flowers, such as I have never seen equalled in any part of the E.; indeed, the whole tract of country E. of Shuster, is thus carpeted, and presents the most beautiful appearance that it is possible to conceive.

March 28th.—After halting two days at Shakar-A'b, I accompanied the Prince a distance of 3 farsakhs, to Khári-Shutur-zár,* where he received the submission of the Bakhtiyárí chief, against whom our expedition was directed, and from whence we proceeded to the famous hill-fortress of Mungasht. The naphtha pits, which are passed on the road from Shuster to Rám-Hormuz, were 10 miles S. of our halting-place. The road, which had preserved a general direction from Shuster of S. 33. E., here made a little deviation to the S., to round a range of very steep and rugged hills called Kúhi-A'smárí, forming the outer barrier of the great chain which we had been gradually approaching.

March 29th.—We marched 6 farsakhs along the skirts of Kúhi-A'smárí to a ruined village named Taúlah, situated at the extreme south-easternly point of the range. This was considered the boundary of the district of Jánnikí,† and the hill-fort of Mungasht was here visible, for the first time, bearing S. 30. E.

March 30th.—We left Taúlah at daylight, and entered the district of Jánnikí; at the distance of 12 miles, over a broken country, we came upon the A'bi-Zard, a stream which rises from the hills of Mungasht, and joining the Kurdistán river, in the plain of Rám-Hormuz, forms the Jerráhí.‡ The road, which had hitherto been sufficiently open the whole way from Shuster, for the space of about half a mile along the banks of the A'bi-Zard, which here pierces a rocky range of hills, became extremely difficult; and I do not believe that we should have been able to have transported our artillery across the pass. On emerging from the defile we entered the plain of Bághi-Malik (the king's garden), a spacious and well-cultivated district, watered by the A'bi-Zard, and devoted almost exclusively to the production of tobacco. We had hitherto followed the ancient high road which conducted from Susiana to Eastern Elymais, and thence across the great range, into Central Persia. This road, which at the present day affords the only direct line of communication between Shuster and Isfahán, followed up the plain of Bághi-

* The *Khári Shutur*, or camel's thorn, is a prickly herb upon which the camels feed in Persia; *zár* is a mere affix of locality, as in *Murgh-zár*, a place frequented by birds; *Naï-zár*, a place of reeds, &c.

† Jánnikí is a corruption for Juwánikí, the name of the tribe that originally inhabited this district.

‡ Jerráhí is a name which I have never seen written: the geographers seem most unaccountably to have neglected all mention of this river.

Malik, to the left, whilst we now pursued a track over a very hilly and uneven country, direct to Mungasht, distant from the river 20 miles. The great range, which is known by the general title of Mungasht, a very lofty and precipitous chain, forming the continuation of the line of Zagros, here bounds the district of Jánnikí-Garmasír. The face of these mountains is without a particle of soil or vegetation, and the highest peak is within the range of perpetual snow; the hill-fort, forming the fastness of the great Bakhtiyárí chief, who has now nearly all the tribes of Luri-Buzurg under his rule, is an isolated mass of rock, standing out detached upon the southern face of the range. The ascent to the fort is exceedingly steep, and the summit of the rock is scarped all round to a depth of about 150 feet, the only means of access being along a narrow and rocky shoulder, to a point where the scarp lowers to about 50 feet, and where it is to be climbed with some difficulty. The open ground upon the summit of the rock may measure ½ a mile in circumference, and it contains two perennial springs; so that, if supplied with provisions, I should consider the fort impregnable. It may be shelled, of course, from many positions upon the slope of the hill, but this would have no great effect; for there are natural caverns upon the summit, capable of holding perhaps 1000 men—Mungasht, or as it should properly be written, Mánkhisht,* has been of great celebrity in the Persian wars. It formed the stronghold of the A'tábegs, who reigned in the Luri-Buzurg during the 12th, 13th, and 14th centuries; and one of these princes, named Takallah, successfully defended it against the armies of Hulákú, during a siege of nine months' duration.† It has been often, indeed, attacked, but I see no reason to doubt the reputation which it possesses among the Lurs, of being a maiden fortress.

April 1*st*.—After remaining a day at Mungasht we commenced our return to Shuster, by the direct road across the mountains. We travelled 6 farsakhs the first day, to Túl,‡ the lower fort, and usual residence of the Bakhtiyárí chiefs; the road lying along the skirts of the great range, throughout the stage. At 4 farsakhs we passed the large village of Abú-l-'Abbás (or Bálibás, as it is called by the Lurs), on the A'bi-Zard, where it descends from the mountains, by a tremendous gorge, into the plain of Bághi-Malik. In this plain, midway between Abú-l-

* In the Nuz-hatul-Kulúb and Sharaf-Námah, it is thus written; but at present it is known by no other name than Mungasht.

† The A'tábeg relying on the signet ring of Hulákú, which was sent him in token of pardon, came down from his stronghold; he was immediately seized, sent to Tabríz, and executed. See Sharaf-Námah.

‡ The district of Jánnikí was named in the last century Tulghar, apparently from the title of this fort.

'Abbás, and the point where I had previously crossed the river, are the ruins of a great city. Unfortunately I did not hear of these ruins until it was too late to visit them, but I acquired much information concerning them from the Bakhtiyárí inhabitants of the district. The place is called Manjaník; and the ruins, which cover an extent of country about 4 miles in circumference, consist of two distinct classes, the huge Babylonian mound, and traces of buildings formed of hewn blocks of stone. There are many distinct remains of the second class, but the great ruin of the place is an immense mound, described to me as little inferior to the castle of Sús, and believed by all the Lurs to represent the identical spot where Nimrod cast the Patriarch Abraham into the fire, with the famous Manjaník, or Mangonel, which the Orientals suppose to have been first used upon this occasion.* Now, it is well known that the Fire-worshippers refer the institutions of their religion, and the veneration which they attach to fire, to this very fable of Nimrod and the Patriarch; and I have no hesitation, therefore, in believing this mound,† which still preserves in its name and story the most holy tradition of the Magi, to represent the site of a magnificent fire-temple: and I shall presently relate many other curious circumstances which illustrate its ancient history.

The A'bi-Zard, which flows through the plain of Bághi-Malik, is a delightful river, of the coldest and clearest water possible, chiefly derived from the snows of the hills of Mungasht; it varies in volume, of course, according to the season of the year. When I crossed, it was a rapid torrent between 2 and 3 feet deep, and about 40 yards in breadth: in the month of May it is said to be often impassable; but towards the autumn it becomes much diminished. It unites with another stream some miles below Bághi-Malik, and, as I have stated, joins the Kurdistán, in the plain of Rám Hormuz, where I conclude it to represent the Korú Khán Kend of Timúr's march, and of Kinneir's map; though from whence such a name was originally borrowed I cannot conceive. The name occurs nowhere, I believe, except in Sharafu-d-dín, and it certainly is not now known in the country. The title of A'bi-Zard, literally the yellow river, is applied to it on account of its exquisite clearness, *Zard* being often used in this sense, when referring to water; and it appears to have been named by the Arabs Nahru-l-Azrak‡ (the blue river), for the same reason.

* The flame of the furnace is said to have been so intense that no one could approach it; this machine, therefore, was invented to cast in the Patriarch from a distance. [Manjaník, anciently pronounced Manganík, was borrowed by the Arabs from the Greek *manganicon*, a military engine. *Mangonel* is probably from the Christian historians of the Crusades. F.S.]

† This fable, which is of great antiquity, is supposed to have arisen with the Jewish Rabbins, who translated "*U'r* of the Chaldees" "the Chaldæan *fire*," the Hebrew אור signifying also "*fire*."—See Hyde, p. 74.

‡ See Lee's translation of Ibn Bátútah, p. 37.

The mud fort of Tul, built upon a high mound, and defended by four pieces of artillery, may be considered formidable enough among the Bakhtiyárís, but it could make no resistance against regular approaches; it is situated in an open plain, at the distance of one farsakh from the river.

April 2nd.—I made a forced march to-day of 40 miles to rejoin the camp at Shakar-A'b. The passage of the hills, which upon the lower road we had traversed along the banks of the A'bi-Zard, was exceedingly difficult; indeed the descent was so precipitous, that we were obliged to dismount, and drag our horses after us for the space of some miles, along the slippery face of the mountain. After having passed this range we pursued the course of a rocky valley, along the northern face of Kúhi-A'smárí, at the north-eastern point of which we emerged from the mountains into the beautiful plain of Gulgír, crimsoned with the wild anemone, and clothed throughout with the richest herbage. We then crossed a range of sand-hills, and descended into the valley which we had followed from Shuster. This tract effects a saving in distance of about 8 miles; but I doubt its being more expeditious than the open road to the S.; it is rarely travelled except by the Bakhtiyárí-I'liyát.

At Tul I gained intelligence of other ruins in this district which excited in me the liveliest interest: it appears that the high road from Shuster to Isfahán, passing up the plain of Bághi-Malik to Tul, follows from thence a difficult defile, through the Mungasht hills, into the spacious plain of Mál-Amír. Here are the ruins of a city, which I believe to represent the Eïdij of the Oriental geographers. The measurements of 3 marches across the mountains from Shuster,* of 4 stages from 'Askari-Mukram,† and of 45 farsakhs from Isfahán,‡ will alone coincide with this position; the bed of the mountain torrent, which was spanned by the magnificent bridge of Jirzád, a work of the age of Ardeshír Bábegán, described by the Orientals § as one of the wonders of the world, skirts the edge of the ruins, and imperfect remains of the buttresses of the bridge are said even to be still visible: and we have a further proof of the identity, in the tradition, which reports the place to have been the residence of the powerful A'tábegs of the house of Fuzlúyah,|| and in the name of Mál Amír (the chief's house), which the ruins have assumed in consequence.

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* Lee's Ibn Bátútah, p. 37. † Jaïhání's Ashkálu-l-'A'lam.

‡ Nuz-hatu-l-Kulúb.

§ In the Athàru-l-Buldán and Murásidu-l-Ittilá', there are very curious accounts of this bridge.

|| The *Sharuf Námah* gives a short sketch of this dynasty. *D'Herbelot* has supposed them to have reigned in *Laristan*, instead of *Luristán*.—See Bib. Orient. tom. i., p. 280.

The place would be well worthy of examination, for the bridge of Jirzád must have been, according to all accounts, one of the most splendid buildings that the Sásánians have left in Persia; and a great road also was carried from this point, across the mountains to Isfahán, which still forms the only practicable line of communication for loaded mules between Shuster and that city. The road is now called the Jádahi-A'tábeg, and is supposed to have been formed by those princes; but I believe that they only repaired an ancient work. I recognise, in this line, the route which is described by Strabo, as conducting from Gabiana (the ancient name of the district of Isfahán) through Elymais to Susiana;* I believe that it was by the same road that Antiochus and Mithridates were enabled to penetrate to the fire-temples of Elymais; and indeed, from the stupendous character of the undertaking, and the immense labour that seems to have been bestowed on it, I am inclined to regard it as a work of the most remote antiquity. But the most interesting spot in all this country, perhaps even in all Persia, is the town of Súsan, upon the banks of the Kuran, 4 farsakhs to the N.W. of Mál Amír: here also are the ruins of a great city, and from the accounts which I have received of it, it cannot be other than a sister capital of Ecbatana and Persepolis. The city of Súsan was principally built upon the right bank of the Kuran, at a point where the course of the river was due W. Forming a semi-circle from the river, and thus enclosing the city, is a range of steep and abrupt hills, through which there is no passage, either along the banks of the river or at other points: a once noble bridge, now almost destroyed, connects this impregnable position with a large mass of ruins upon the left bank of the river, which are again bounded to the S. by another range of hills, extending at both points to the precipitous banks of the Kuran, and traversed by two solitary passes. On the right bank of the river, near the bridge, are said to be the remains of a magnificent palace; the ground all around is now planted with orchards, but the general design of the building is to be traced, and many pillars still remain entire. At a short distance from hence, to the N.E., and at the foot of the hills, is the tomb of Daniel; called Dánïyáli Akbar, the greater Daniel, in contradistinction to the other tomb at Sús, which is called Dánïyáli Asghar, or the lesser Daniel. The building is said to be composed of massive blocks of white marble; and a large reservoir, formed of the same materials, is in front of the tomb. This is fed by a small stream, which here descends from the hills, and it contains a vast quantity of sacred fish, that are regarded with the most superstitious attachment. Adjoining the tomb is a large slab of marble, engraved with a perfect cuneïform inscription, and many

* Strabo, p. 527. (p. 744 Ed. Casaub.)

other broken slabs, similarly sculptured, are said to be found among the ruins. On the left bank of the river, the principal ruin is a large fort, at the foot of the southern range of hills. These hills are named Gilgird; and the fort is called Kal'ahi-Gilgird—from the description I judge it to be a Sásánian edifice. The high road, conducting from Mál Amír to Súsan, traverses the chain of Gilgird by a narrow pass at the S.E. corner of the city; and at the entrance to this pass, from the plain of Mál Amír, is one of the great curiosities of the place: a large portion of the face of the rock has been artificially smoothened, and an immense tablet, with very long cuneïform inscriptions, has been engraved upon it. There are said to be about twenty figures sculptured upon the tablet, and the inscriptions have been uniformly described to me as fully equalling in length those of Bísutún. There is also a natural cave near this place, which is called Shikafti-Salmán,* and is visited as a place of pilgrimage by the Lurs. I am indebted, I must observe, for this description to oral information only, but I cannot be far wrong, for I was so particularly interested in the first accounts which I heard of Súsan, that during my future intercourse with the Bakhtiyárís, I took the greatest possible pains to collect accurate intelligence, and after a series of minute inquiries from different inhabitants of the place, at different times, I found all their evidence to agree in the points that I have above detailed. Regarding the cuneïform inscriptions there cannot be a question. I have repeatedly produced copies of inscriptions in several different characters, and in showing them to the Bakhtiyárís they have invariably selected the arrow-headed as the style of writing on the slabs and sculptured rocks of Súsan.

I heard also of the ruins of a great building, upon the banks of the Kuran, a short distance below Súsan, which was named Masjidi-Suleïmáni-Buzurg: by the Bakhtiyárís it was usually likened to the superb remains at Kangáwer, and it doubtless, therefore, marks the site of another of the wealthy temples of Elymais.

I have thus noticed, I believe, all the interesting matters of geography which fell under my own observation, or with which I became incidentally acquainted during my travels in Susiana and Elymais. I will now state the impressions that I have derived from them in regard to the ancient history and comparative geography of these provinces; and I do so, I confess, with much diffidence, for the subject is one of extreme difficulty, and I am obliged to disagree on some material points, from the generally received opinions. I must also observe, that I merely propose to state the general result of my researches—the line of reasoning by which I

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* Salmán was 'Alí's tutor, and the two are associated in a joint incarnation in the creed of the 'Alí-Iláhís.

arrive at my conclusions being given in detail, in a work on the comparative geography of Persia, on which I have been engaged for some time in preparing for publication.

I believe, then, that in ancient times, there were two cities of the name of Súsan, or Susa, in the province of Susiana—the more ancient, which is the Shushan of Scripture, being situated at Súsan on the Kuran, or Eulæus; the other, the Susa of the Greeks, at Sús, near the Kerkhah, or Choaspes. The river of Dizfúl I consider to be the Coprates; the A'bi-Zard, and its continuation the Jerráhí, the Hedyphon, or Hedypnus; and the united arms of the Kuran and Dizfúl river, the real Pasitigris.

And firstly, with regard to Súsan—the very expression of Scripture, "Shusan, the palace,"* would appear indicative of a distinction from some other city of the same name. Daniel, be it remembered, was in the palace, yet he saw the vision on the borders of the U'laï, and heard the voice between the banks of the river. From the mound of Sús, the Kerkhah is 1½ mile distant, but at Súsan the river does actually lave the base of the great ruin. The ancient tomb of the greater Daniel may be also taken into account; and the cuneïform inscriptions are certain evidences of antiquity. As this city did not lie upon Alexander's march, his historians have failed to notice it; but in the later geographers, who had indistinct information of the place, and confounded it with the great city of the same name which formed the capital of the province, we discover some traces of its true position. Thus, when Pliny says,† that the Eulæus surrounded the castle of Susa at the distance of 250 miles from the sea; and when Ptolemy places Susa in the north-western corner of the province of Susiana, upon the left branch of the Eulæus, and upwards of a degree above the point of confluence of the right arm of the river,‡ they both can only refer to Súsan and the Kuran. This tract of country, extending S. of the Kuran, and containing the districts of Súsan, Mál Amír, and Jánnikí, appears to have formed a part of the great province of Elymais, and after the period of the Macedonian conquest to have risen to much wealth and prosperity—here, then, I look for the rich temples which attracted the cupidity of the Syrian and Parthian monarchs.

The fire-temple dedicated to Anáhíd, which was supposed by Strabo§ and Diodorus‖ to be sacred to Jupiter, and which, in the Maccabees,¶ is named, more properly, the temple of Nanea, may be represented by the ruin in the plain of Baïtáwand: it was here that Antiochus the Great lost his life. The city of Elymais,

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* Daniel, chap. viii. v. 2. † Book vi. c. 27. ‡ Ptol. book vi. c. 3.
§ Strabo, p. 744. ‖ Diod. Sic. Fragm. 34, book xxvi. ¶ II Mac. c. i. v. 13–16.

which was attacked by his son, Antiochus Epiphanes,* I believe to be Súsan; and the temple which he sought to pillage, to be the superb ruin of Masjidi-Ṣuleïmáni-Buzurg: this, too, will be the "templum Dianæ augustissimum illis gentibus," of Pliny,† which was situated upon the Eulæus, below Susa. Antiochus Epiphanes, after his defeat, retreated to Tabae,‡ the name of which is preserved in the modern Ṭáb, and there expired in agony, either of his wounds or of a bodily malady. The third great expedition against these fire-temples was that undertaken by the Parthian king, Mithridates. He is said to have robbed the temple of Diana, named Azara, of ten thousand talents, and to have taken Seleucia, on the Hedyphon.§ Seleucia is also mentioned by Pliny, in this quarter of Elymais; and he names the river Hedypnus: now Hedyphon and Hedypnus are manifestly of Greek derivation,|| merely implying the agreeable qualities of the river; and as we also know that the stream disembogued into the Eulæus, I am induced to identify the names with the A'bi-Zard of the present day. In this view Seleucia will be represented by the ruins of Manjaník, and the great mound which preserves the tradition of Nimrod and Abraham will mark the site of the fire-temple that fell into the hands of the Parthian king. The temple is named Azara, in Strabo, which is evidently a derivation from A'zar, signifying fire—probably it is a mere contraction of A'zar-gáh, a fire-temple. This temple, also renowned doubtless for its sanctity, throughout Persia, will thus represent the holy place of refuge, the "Asylum Persarum," with which Pliny illustrates the course of the Hedypnus: it appears even to have retained its celebrity after the Arab conquest, for I can discover no place which will agree as well as this with the great fire-temple of Márín, upon the confines of Fárs and Khúzistán, that is described in the eleventh century¶ as one of the most famous of the Magian places of worship. Pliny unites with this Elymæan Seleucia, a name which I cannot but consider as the real appellation of the city that he had formerly confounded with the great capital of the province, in his description of Súsa: I allude to Sosirate; and as I find in the Persian geographers, that the Súsan of Luri-Buzurg was also named 'Arwah, or 'Arwaṭ,** I regard the title employed by Pliny as a compound of the two terms. This name of 'Arwaṭ, applied to the ancient city of Súsan, appeared to me, at first, a certain indication that the ancient Oroatis was to be recognised as another name for the river Kuran; but I found on examination, that the measurements and relative descriptions of all ancient geographers

* 1 Maccab. c. vi. v. 1—4. Josephus, Ant., book xii. c. 9. s. 1.
† Pliny, book vi. c. 27. ‡ Polyb. Excerp., lib. xxxi. Edit. Vales, p. 144.
§ Strabo, p. 744. || 'Ηδύφωνος, sweet sounding—'Ηδύπνοος, sweetly breathing.
¶ By Jaiḥání. ** Nuz-haṭu-l-Ḳulúb, and Zeïnaṭu-l-Majális.

clearly pointed out the Táb, as the representative of that river; and I have not ventured, therefore, on the sole authority of an etymological coincidence, to impugn their distinct and united evidence. Súsan, under the Sásánian monarchs, seems to have continued a place of some consequence, and from its impregnable character, to have offered a fit spot for the creation of their great state-prison, the famous castle of Lethe, where they confined their prisoners of distinction. It was here that Shápúr Dhú-l-aktáf confined the unfortunate Arsaces II., King of Armenia; and it was from hence that the Roman prisoners, taken at Dárá, under the reign of the younger Justin, after a long captivity, effected their remarkable escape.* It is named by Ammianus, Agaban,† probably the Pehleví word, which the Greeks translated by Lethe; Moses of Chorene places it in Khúzistán;‡ and from the account of Theophylact§ we are able to identify its exact position at Súsan; he names it the castle of Giligerd. I have mentioned that the Sásánian fortress of Súsan still retains the title of Kal'ahi-Gilgerd; it was not far, he says, from Bendosabiron: by this title he alludes either to the Bandi-Shápúr, at Shuster, or to the city of Jundí-shápúr, and either indication will agree with the position of Súsan; and he adds that it was in the district Bizaca, a name that may perhaps be recognised in the title of Bázuft, which still pertains to a tract of country in the vicinity of Súsan. The ruins at Sús, near the Kerkhah, certainly represent the Susa of Herodotus and of the campaigns of Alexander and his successors; but I rather suspect that the fables of Memnon,|| and his parents Tithon and Cissia, which were applied to this city by the early Greeks, and were copied by later writers, should more properly belong to Shushan the palace, upon the river U'laï; and that there may thus be some truth in the statement of Pliny that the younger Susa was founded by Darius Hystaspes. This city of Susa, on the Choaspes, continued from the age of Alexander to the Arab conquest of Persia to be a great and flourishing capital, and it naturally therefore attracted to itself the traditions which really applied to the more ancient city on the Eulæus. Thus, when the Nestorian church was established in Susiana, in the third century, the traditions regarding the prophet Daniel became naturalised in a foreign soil: there is abundant evidence that the Syrian church believed this city of Susa, where they instituted a bishopric very shortly after their arrival in the province,¶ to have been the scene of the divine revelations, and that they soon began to attach a su-

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* Cedrenus, Ed. Xyl. p. 325. Agathias, book iv. c. 28. Procopius, Bell. Pers. i. 5.
† Amm. Mar. book xxvii. c. 12. ‡ Book iii. c. 35. § Theophyl. Sim. lib. iii. c. 5.
|| The route across the mountains, which is named Jádahi-A'tábeg, will thus represent the road of Memnon noticed by Diodorus.
¶ See Asseman. tom. i. p. 3. 12; tom. iv. p. 781.

perstitious reverence to certain spurious relics of the prophet's body. In these Nestorians I recognise "the followers of the book,"* who, at the period of the Arab conquest, were accustomed, in time of drought, to carry the coffin into their churches, and in offering up their prayers for rain, to make use of it as an intercessor: the whole story of the tomb of Daniel, indeed, and perhaps too the stone sculptured with the figures of the two lions and a man, I consider to have originated with the Nestorian church; and I regard it as not a little favourable to my belief in the distinction of the two Susas, that upon the banks of the Eulæus, an ancient tomb should have existed during so many centuries, unnoticed and perhaps unknown, which should still at the present day claim to be superior to the shrine whose fame has been spread by the voice of superstition over the Christian, Jewish, and Mohammedan worlds. The history of the sacred fish also, which in Benjamin of Tudela, and also in a Persian MS.† is attached to this tomb upon the river of Shápúr, appears to have been transplanted from the other shrine. In the Shápúr stream, not only are there no sacred fish, but, as far as I can learn, there are no fish at all; whilst I have noticed the ancient marble reservoir of Súsan filled with fishes, which are daily fed by the inhabitants of the place.

The bridge of the Choaspes, mentioned by Strabo, and by which Alexander travelled to Susa, is to be recognised in the ruins of Páï Púl, that I have already noticed. The Sásánian city of Kerkh,‡ or Iwáni-Kerkh, upon the right bank of the Choaspes, appears to represent the Kerkhi-Ládan of the Syriac writers, which was conjoined with the bishopric of Susa.§ We may gather that the two cities were in the immediate vicinity of each other, as well from this circumstance as from the fact that St. Simeon, the Primate of Seleucia, executed by Shápúr Dhú-l-aktáf, at Kerkhi-Ládan, was interred at Susa: and the title Kerkh, which Assemanni always renders by the word city, I believe to have been the proper name of the place.|| The Arabic geographers, Jaïhání, Idrísí, and Yákút, all mention the name of Kerkh, or Kerkhah, among the cities of Khúzistán, distinct from Kerkhi-Mísán, or Mohammerah, the Charax Spasinæ of the ancients; but, as they do not give any measurements, it is impossible to be quite certain with regard to this identification. Kerkhah and Susa appear to have fallen into ruin during the thirteenth century. I conjecture that the Choaspes derived the name of Kerkhah, which it still retains, from the title of this town; but even this point

* The story is told by Jaïhání. † Nuz-hatu-l Kulúb.

‡ The villages of Carhæ (Diod. b. xvii. c. 11), which Alexander reached on the first march from Susa, after crossing the Kerkhah, would seem to be represented by this town of Kerkh.

§ See Assemanni, tom. ii. p. 460; tom. iv. p. 760.

|| Perhaps, also, this Kerkhah may be the Aracha of Ammianus.

must remain uncertain, for neither in Abú-l-fedá, nor in any other of the old Arabic authors, do I find any notice of the river Kerkhah, and I have never met with the name even, but in a single Persian MS. of the fourteenth century, where a most inaccurate account is given of its course.* I know not the derivation of the name Choaspes; but there is certainly no such mountain among the ranges of Zagros as Kúh A'sp, horse hill, which D'Anville states to have given rise to the title.

The reasons for the opinion, now almost universally entertained, of the identity of the Choaspes and Eulæus, in defiance of the direct statements of Strabo † and Pliny, ‡ and the scarcely less direct inference of the voyages of Nearchus and Alexander, appears to have been the application of both the names to the river that flowed by Susa, and the contradictory statements regarding the excellent water of one of these rivers, which was exclusively drunk by the monarchs of Persia. I have removed the one difficulty to the distinction of the rivers, by the distinction of two cities of the names of Susa and Súsan; the explanation of the other is still more easy. The fact is, that the waters of both these rivers, Kerkhah and Kuran, are almost equally renowned for their excellence. It is true that the Kuran, traversing the great cities of Shuster, 'Askari-Mukram, and Ahwáz, whilst the banks of the Kerkhah were deserted, has become more widely celebrated throughout the Mohammedan world; but in the province, at the present day, the Kerkhah is considered but little if at all inferior, and the waters of these two rivers, be it observed, are regarded now, as in ancient times, as far surpassing all the other streams or springs in the world. The Orientals, it is well known, are most particular about the quality of their water, whilst, at the same time, their habits are remarkable for permanence of character; and thus it would have been most extraordinary that, as we have no reason to believe the rivers to have changed the qualities of their waters, nor the Persians to have changed their taste, the Kerkhah should have formerly enjoyed an exclusive celebrity, when the neighbouring stream of the Kuran afforded water of an equal or perhaps superior quality.

Most ancient authors, confounding the two cities of Susa, confounded also the rivers, and thus described the excellence of the Choaspes, or Eulæus, as they referred to the one Susa or the other; but Pliny,§ who has distinguished the rivers, distinctly states also that they were both equally approved of by the Parthian monarchs, and Solinus has followed his authority.|| I have now mentioned the chief grounds of arguments upon which I rest my distinction of the Choaspes and Eulæus; and I believe the

* Nuz-hatu-l-Kulúb. † Strabo, p. 728. ‡ Pliny, book vi. c. 27.
§ Book xxxi. c. 3. || Sol. Polyhist. c. xxxiii. xxxviii.

darkness which has hitherto enveloped the subject is beginning gradually to disappear.

I have stated that the real Pasitigris was formed by the junction of the Coprates and Eulæus—just as we read in a Persian work,* "the united rivers of Dizfúl and Shuster are named Dujeïli-Ahwáz; yet the eastern branch of the river frequently assumed the name of Pasitigris, or simply Tigris, and more frequently the united arms retained the title of Eulæus in their southward course to the sea, precisely in the same way as the name of Dujeïl, or Dijlah, was usually applied, in the middle ages, to the eastern branch of the river as high as Shuster, and the title of Kuran, at the present day, continues to be given to the river after the confluence of the stream of Dizfúl, and as far even as the point of its disemboguement in the Persian Gulf. This river, I must also notice, is stated by the Arabs to have been named by the old Persians Dijlahi-Kúdak, or the Little Tigris,† and this was translated into Arabic by the diminutive form of Dijlah, Dujeïl. With this indication, then, I have no difficulty in recognising in the Greek πασὶ the old Persian word Pas, signifying "low, inferior," and in thus translating Pasitigris, like the Arabic Dujeïl, "the inferior or little Dijláh."

In fact, the identification of the rivers of Susiana, according to my view, appears to me to remove all the difficulties arising from the positive evidence of the historians, except in one solitary instance, and, indeed, to accord sufficiently well with the more confused notices of the geographers. Alexander crossed the Kerkhah, or Choaspes,‡ in his march from Babylon to Susa; he came upon the Pasitigris, or Dujeïli-Ahwáz, at 4 marches from Susa,§ in his route to Persepolis, the bridge of boats occurring, I suspect, at the town of Ahwáz. At the period of Alexander's return, Nearchus had sailed up this river to the same point;|| and when the army marched to Susa, he brought the fleet above Ahwáz (which, before the construction of the band, I conceive to have been perfectly practicable) to the mouth of the Shápúr river; and from hence he navigated that stream to Susa.¶ Alexander afterwards embarked on the Shápúr, and, following the course of it to the great river, sailed down the Eulæus (as we should say, at the present day, he sailed down the Kuran) to the sea, sending his shattered vessels through the Hafar cut into the Tigris. Again, Eumenes, retiring from Susa,** came to the Tigris—that is, the Kuran, Dujeïl, or Dijlah. We must suppose him to have crossed the river immediately below the confluence of the Dizfúl branch, and then the measurement of one day's journey from Susa, which

* Tażkarati-Shusteríyah. † Muráșidu-l-Aṭṭilá'. ‡ Quint. Curt. book ii. c. ix. § Quint. Curt. book iii. c. 1. Diod. Sic. book xvii. 67. || Arrian's Nearchus, 4. ¶ Arrian, book vii. c. 7. ** Diod. Sic. book xix. 17.

is given by Diodorus, will be sufficiently correct. Antigonus, in his pursuit, could scarcely have made more than two marches to the Coprates, or river of Dizfúl; and when it is stated that, on account of the extreme heat, he encamped before sunrise on the banks of the river, I understand this of the A'bi-Shápúr. He probably reached the Coprates very near the point of junction, for the camp of his enemy was only 80 stadia distant. Why he should have preferred attempting the passage of the two arms successively, instead of crossing below the junction, like Eumenes, it is not easy to say; perhaps he considered that, as his enemy's force was beyond the eastern branch, the passage of the first river would be effected without molestation, and he should be able afterwards to seize on the bridge which crossed the second. If this were his view, however, he was out-manœuvred; for Eumenes re-crossed the Kuran when a part only of his adversary's forces had been passed over, and, attacking them before they could be supported, he gave Antigonus a signal defeat. From hence Antigonus is said to have retired to Badaca, on the Eulæus; and in this single passage is the only real difficulty which I experience in the whole illustration. Antigonus, of course, from his position on the Coprates, could not possibly have reached any part of the Kuran, which all other evidence points out as the real Eulæus; and I am fain, therefore, to consider this mention of the Eulæus an error of Diodorus. In describing the march of Alexander from Susa to Ecbatana he had previously mistaken the Choaspes for the Tigris,* and this second error need not, therefore, so much surprise us. Badaca I believe to have been situated about 25 miles N.W. of Susa, between the two arms of the Duwáríj, where some very remarkable ruins still exist of the same character as those of Susa, and known in the country by the name of Páták, or Pátákah; and I am the rather inclined to this opinion, as there are no ruins upon the Kerkhah to the N. of Susa which could possibly represent Badaca, and the place must necessarily have been considerably to the northward in this direction, to have enabled Antigonus to reach the inhabited parts of Media at Khorram-ábád, in nine days, even by the short cut across the mountains of Charban.†

We now come to the geographers. The evidence of Strabo principally relates to the lower course of the rivers; and bearing in mind that his Eulæus and Pasitrigris refer to the same river, I doubt not but that the publication of the Euphrates papers will serve to explain all difficulties. When he states, however, on the authority of Polyclitus,‡ that the Choaspes, the Eulæus, and the

* Diod. Sic., book xvii. c. 11. † Pliny, book vi. c. 27. ‡ Strabo, p. 728.

Tigris flow all into one lake, and thence into the sea,' he distinguishes most satisfactorily between the two first rivers, and evidently refers to the Kérkhah, the Kuran, and the Dijlah, which I understand there is reason to believe did really, at one time, all unite their waters in a great húr, or marshy lake, before they fell into the sea.

Pliny,* confused, as he always is, from the multitude of authors whom he consulted, is still, I believe, to be explained. He states that the Choaspes, or Kerkhah, fell into the Tigris, and that the fleet of Alexander sailed up the Pasitigris, or Kuran, from the sea, and in both of these statements he is perfectly correct; but, in his account of the Eulæus, he has confounded the two rivers together, apparently from his confusion of the two cities of Susa, which they respectively watered, and this, too, may be proved, without much difficulty; for, having identified his Mesobatene with Máh-sabadán, the Eulæus, which traversed this district above Susiana, can only represent the Kerkhah; and yet, in his further notice of the river, the Kuran will alone answer the description. Thus, he states in two passages, that the Eulæus formed the partition between Susiana and Elymais, which country, extending to the sea-shore, was divided from Persis by the Oroatis, or Táb; and, again, that the Eulæus received into it the Hedypnus, from Elymais, which river can only be represented by the Jerráhí and its branches, and another stream from Susiana, not otherwise mentioned by him, which also clearly refers to the A'bi-Dizfúl. When again he states, that the Eulæus surrounded the citadel of Susa, I cannot but recognise the Kuran and Súsan; for, as I have shown, the Kerkhah flows at the distance of 1½ mile from the great mound of Sús. His evidence, moreover, regarding the embouchure of the river, appears to me certainly to denote the Kuran; but the officers of the Euphrates expedition, who minutely examined the lower course of the river, will be better able to determine this point.

Respecting the other geographers I have little to add. Ptolemy† mentions only three rivers in Susiana, the Mosæus, the Eulæus, and the Oroatis: and thus, whether his Mosæus, or river of Mísán, designates the Kerkhah, or the Bámishír, the Eulæus, intervening between this and the Táb, can only denote the Kuran. I have before noticed the applicability of the inland course of the Eulæus, given by this geographer, to the confluence of the two rivers of Shuster and Dizfúl, 80 or 90 miles below Súsan, or Susa. Marcian is a mere copyist of Ptolemy; and Ammianus, who also drew from the same source, has no further difference than

* Book vi. c. 27. † Book vi. c. 3.

the substitution of the name of Harax* for Eulæus, which seems to have been borrowed from the town of Spasinæ Charax, at the mouth of the river, rebuilt by Ardeshír Bábegán, under the title of Kerkhi-Mísán, or Ushtun-ábad.†

I am not acquainted with the arguments that have been lately brought forward, to revive the old opinion of the identity of Susa and Shuster, or I should have more particularly noticed them. Such an idea does not appear to me, however, to be remotely consistent, either with the authorities of Oriental writers, or with the existing geography of the province. I regard the present town of Shuster as a foundation of the Sásánians; and, in proof of its inferiority to Sús, or Susa, I may mention that it did not rise into sufficient consequence to become the see of a Christian Bishopric until two centuries after the establishment of the Nestorians in Susiana,‡ and when the neighbouring city of Sús had already enjoyed that honour for at least 140 years.

I must again excuse the brevity with which I have treated this hitherto much confused inquiry, by stating that a detailed examination of all the evidence and the inferences which I draw from each particular statement are embodied in a work now preparing for publication, upon the comparative geography of Persia.

May 16*th.*—After a further residence of a month and a half in the province of Khúzistán, during which time I gained much of the intelligence that I have here communicated, I left Dizfúl with a small party, and without baggage, for Khorram-ábád. There are three roads between these points: the high road of ten káfilah stages, which conducts along the line that I have already described to Chuli-Jáïdar, and from thence strikes north-eastward to Khorram-ábád; the second of eight stages, which diverges from the A'bi-Zál, and crossing the Káïlún range, rejoins the high-road at Dehlíz; and the third, directly across the mountains, in a line nearly due N., which curtails the distance between the two points to four long marches. I preferred this last road, as well on account of its shortness, as from its never having before been travelled by an European. I marched the first day 8 farsakhs, to the plain of Kír A'b (the bitumen water). The road traversed the plain of Dizfúl, in a direction due N., to the western point of the fort of Tangawán, and, rounding this, descended among some very steep ravines to the little plain of Kír A'b, which lay at the extreme roots of the great range between the stream of Balád-rúd and the mountains. I was not a little sur-

* Book xxiii. c. 6.

† Tabarí and Murásidu-l-Attilá.'

‡ The Christian church was established in Susiana about A.D. 260. St. Milles, bishop of Susa, suffered martyrdom in A.D. 330; and Phuses was first appointed bishop of Shuster in about A.D. 460. See Asseman, tom. iv. p. 421; tom. i. p. 12; and tom. i. p. 353.

prised to detect among these steep ravines the evident traces of a broad paved road, leading into the secluded plain of Ḳír A'b, which appeared to come from the direction of Ṣús. I also found a heap of mounds in the plain, the remains of an ancient town; and uniting these indications with the bitumen pits, which abound in the neighbourhood, and from which the place has obtained its name, I could not but fancy that I beheld the site of the Eretrian colony of Ardericca. It is true that the distance in a right line from Susa is too much to accord with the 210 stadia of Herodotus, and he seems to have actually visited the place himself;* but, in all other respects, it will agree sufficiently well both with his account and with that of Damis.† The liquid bitumen is collected at the present day in the same way as is related by Herodotus: the ground is impregnated with this noxious matter, and the waters are most unwholesome. The Balád-rúd may be the stream that was brought round the town to defend the Greek colonists from the attacks of the barbarians; and the rising ground behind the ruins is, at the present day, the part of the district chiefly under cultivation. I must also observe, that there are positively no bitumen or naphtha pits in all Susiana but at this place, and near Rám Hormuz;‡ and of these two, Ḳír A'b has certainly the best claim to be considered the site of Ardericca. Larcher§ indicates the exact bearing from Susa, I know not on what authority, as N., inclining a little to the east, and this will exactly suit the position of Ḳír A'b. Ḳír A'b forms the Ḳishlák, for some 200 or 300 families of the Rákí and Pápí Lurs; but it is disliked as a residence, on account of its unhealthiness.

May 17*th.*—We crossed on foot a most precipitous range of hills, a prong of the great chain, rising up abruptly behind Kír A'b, and descended into the beautiful glen of Tangi-Zardáwar. Our horses were with difficulty dragged over this range; and a mule, heavily laden, could not have passed it. The Tangi-Zardáwar is a narrow and richly-wooded valley, running up in a direction of N. 20 W. for about 20 miles, into the range between a line of rocks of immense height, and almost perpendicular. After a march of 5 farsakhs, we reached the head of the valley, and here an attack of fever and ague obliged me to halt, the effects of one night's sojourn in the pestilent plain of the Eretrian colony.

We were now approaching the wildest part of the Lurish mountains, inhabited by the tribe of Dirikáwand, who, confiding in their fastnesses, have been long in a state of open rebellion, and who subsist almost entirely by the plunder of travellers. We were,

* Herodotus, book vi. c. 119.
† Philostrat. Apollon. Vit. book i. c. 24.
‡ Also at Bandi-Kír, or Kíl, see p. 51; and again between Shuster and Rám Hormuz, see p. 51.
§ Larcher's Herodotus, vol. vii. p. 36.

therefore, well on the alert; but a party of these marauders, who surrounded our little camp throughout the night, contrived to carry off a number of stray articles; and, in the grey of the morning, two of our servants were seized by them and stripped of everything.

May 18*th*.—At the head of the valley the great hills rise up almost perpendicularly to a tremendous height, and seem to shut out all further progress. A rocky path, however, conducted us to the summit, after a most tedious and difficult ascent of two hours; and here, from the sultry plains of Susiana, where, at this season, the heat is almost insupportable, we found ourselves suddenly transported into a climate where the snow lay deep in all the sheltered crevices of the mountains; and the trees, which in the plain were in their full summer foliage, were only just beginning to show their early sprouts. As I knew that I should cross some of the most elevated land in Luristán, I had brought with me a mountain barometer to determine the elevation of some of the highest peaks; the tube, however, was broken by the fall of the servant, who had charge of it, in the ascent of this mountain, and I thus lost an opportunity which may probably never occur again. This mountain is named Bí-A'b,* from its possessing no water, but that supplied by the melting of the snows; it is a continuation of the outer chain of Zagros, being connected with the range of Mángerrah to the west, where there is a hill fort of some celebrity in Oriental history, and with the great mountain of Sháh-zádah Ahmed, to the east, so called from the tomb of a pír of that name, which is built upon its summit. This Sháh-Zádah Ahmed is stated to have been one of three brothers; the other two were Sultán Mahmúd, interred at Hulílán, near Kirmánsháh, and Sultán Ibráhím, who, under the name of Bábá-buzurg (the great father), is worshipped as the Deity throughout Luristán. Sháhzádeh Ahmed and Sultán Mahmúd are included among the Haft-tan by the 'Alí Iláhís, and both of the shrines, therefore, are places of much sanctity. After a gradual descent for some miles from the hill of Bí-A'b, we crossed another ridge of the great chain, called Kúhi-Anárah-rúd, to a stream of the same name, which forms the left branch of the A'bi-Zál. Beyond this stream again we traversed a third range, called Kal Aspad,† to the bed of the A'bi-Zál, salt even in this early part of its course, and filled with huge fragments of rock, similar to those which I found below. The country all around here, as far as the eye can reach, presents to view a mass of the most tremendous mountains, which appear so intermingled with each other, that it is not easy at first to detect their proper lines. From the bearings, however, which I took

* Pronounced in Lurish, Bí-A'ú. † The white peak.

from the highest peaks, and from the information of our guides, I was able to distinguish that these three ridges of Bí-A'b, Anárahrúd, and Kal Aspad, were all parts of a single chain connected with the line of Káïlún, Kirkí, and Mángerrah, and forming the outer barrier of Zagros. In a little defile to our left hand, as we crossed the Kal Aspad, we saw a tomb named the Imám Zádahi-Pír Már,* a shrine of great celebrity in Luristán. This saint is said to have possessed the miraculous power of curing the bite of all venomous serpents; and, at the present day, whenever a Lur in the vicinity is bitten by a snake, he repairs to the shrine, and, according to popular belief, always recovers. The descendants of this holy personage, too, claim to have inherited the miraculous power, and I have certainly seen them effect some very wonderful cures. The Lurs believe that the cure is performed merely by the touch of the cold blade of a knife which belonged to the great Pír Már, and is still preserved in his family; but I saw that the real antidote, which, however, is not a little curious, was contained in a poultice of leaves and wild herbs kept constantly applied to the wound.† We halted at an open spot in a wooded valley, 3 miles beyond the A'bi-Zál, having been ten hours in crossing the great chain from the head of the Tangi-Zardáwar.

May 19*th*.—We were still in a very high country, as we might perceive by the freshness of the air, and by the trees being not yet in full leaf. After crossing another little stream which falls into the A'bi-Zál, we commenced the ascent of the second chain, named Kúhi-Gird.‡ This was not quite so difficult as the ascent of the mountain of Bí-A'b; but still we were obliged to perform it on foot, dragging the horses after us with much labour. From the summit of the mountain we could trace down the valley of the Kerkhah, at many points overlooking the heights of Káïlún and Kirkí, and through one opening in the Mángerrah range, we obtained a view of the low country of Susiana, stretching away in a sea of mist farther than the eye could reach. The descent of the Kúhi Gird chain occupied two hours; and in the little plain of Táyín at its foot, the change from a cold to a hot climate again became most marked. Táyín is a narrow plain stretching W.N.W. and E.S.E. between two great chains of mountains, and watered by a stream which falls into the river of Khorram-ábád; it is now uncultivated, but retains the marks of former habitation. We had been only five hours from our last stage, but the return of my intermittent fever obliged me to halt. Our provisions were now expended, for we had calculated on reaching Khorram-ábád upon

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* *Pír Már* signifies "Saint Snake."

† The moral effect of confidence would also have some share in the patient's recovery.

‡ Round hill.

the fourth day." I therefore made an exertion in the afternoon, after the height of the fever was over, to push on to the plain of Khorram-ábád, where we might procure supplies; but I was unable to proceed more than a farsakh and a half over a low range which formed the outer line of the third great chain, and our party accordingly went fasting to bed on the banks of the little stream of Káyún.

May 20th.—We now began to cross the third great chain, which, in this part of the line, is called Kúhi-Haftád Pehlú (the seventy-sided hill), to denote its infinite ramifications. It was here formed of two ridges, between which there was some extent of open table-land, which is one of the Yailáks of the tribe of Dirikáwand. From the summit of the northern ridge we saw the rich plain of Khorram-ábád stretching at our feet; and, after a wearisome descent through a thick forest of oak-trees, which occupied us nearly three hours, we at last reached a camp of I'liyát, and were kindly received by a Sayyid, a descendant of Sháh-zádah Ahmed, as he averred, who entertained me with a number of curious stories regarding the faith and superstitions of the Lurs. This was the first inhabited spot that we had seen since we left the plain of Kír A'b, and the party, having fasted now for forty hours, enjoyed with no small relish our I'líyát repast. After breakfast I rode into Khorram-ábád, a distance of 5 miles from the foot of the hills, through a richly-cultivated district thronged with villages and gardens. The general direction of our line from Dizfúl had been three or four points to the eastward of N., instead of N. 22° W. as I had been led to expect from the maps. Indeed, from the comparison of a number of routes, I cannot but conclude that Khorram-ábád has been laid down very erroneously in the maps hitherto published; and I regret much therefore that I omitted, during my short stay, to determine the position astronomically.

Khorram-ábád is a singular place; a range of rocky hills stretching across the plain, in the usual direction of N.W. and S.E. has been suddenly broken off, to admit the passage of the river, for the space of about three-quarters of a mile, leaving, in the centre of the open space, a solitary rock nearly 1000 yards in circumference; the rock is very steep, and near its summit is a most copious spring. This is the fort of Khorram-ábád. It is surrounded by a double wall at the base, and the summit, where the palace is built, is also very strongly defended. The palace, which was erected by Mohammed 'Alí Mírzá, is a very elegant building. A magnificent reservoir, 60 yards by 40, which is fed by the spring, has been formed within it, and there is also a garden of some extent. The fort contains exclusively the palace and

its dependent buildings. The modern town, which is small, containing not more than 1000 houses, is built below the fort upon its south-western face. The river, a broad shallow stream, passes along to the S.E. of the fort and town; the banks are covered with gardens, and among these are to be seen the remains of the old town, the capital of the A'tábegs of Luri-Kuchuk. A lofty brick minaret, of the class peculiar to the Seljúkian ages, is chiefly conspicuous, and there is also a very curious massive stone pillar inscribed all round with an Arabic inscription, in very legible Cufic characters, which I much regret having had no time to copy during my short stay; for, in looking it over, I could distinguish the name of Shujá'u-d-dín, the first of the A'tábegs, and I doubt not but it would throw much light on the origin of this powerful dynasty of the Khúrshídís,* regarding whom so little is known in Europe, or even in the East itself.

The name of Khorram-ábád does not occur, I believe, in writers antecedent to the fourteenth century. Before that period the place was called Samhá, or Diz Siyáh,† the black fort, in allusion to the colour of the rock upon which the castle is built. In the old geographers it seems to be indicated by the name of Shapúrkh-ást, at least I can find no other possible representative for that city; and this title would denote a Sásánian origin. There are no sculptures, however, at Khorram-ábád, or, indeed, any remains that I should ascribe to a higher antiquity than the eleventh or twelfth century.

The common Lurs, it is true, believe that there is a great tablet in the range of Yáftah-kúh, to the N.W. of the city, sculptured with the figure of a man and his dog, or rather that this man 'Alí and his dog were suddenly removed to the face of the rock, and there turned into stone, to be *found* there for ever;‡ but all intelligent individuals whom I have questioned do not pretend anything more than that, in an inaccessible part of the mountain, the natural rock presents something like the appearance of these two figures. I mention this, as I have heard it surmised by many Persian travellers, from the reports current among the Lurs, of the wonders of Khorram-ábád, that it might represent the site of the Baghistane of antiquity. The fort of Khorram-ábád, from its peculiar position, however, must always have been a place of some consequence, and formed, probably, from remote antiquity, the

* This dynasty reigned in Luri-Kuchuk from A.D. 1155 to about A.D. 1600. The Sharaf Námah contains the only detailed account of them that I have ever seen. D'Herbelot has not noticed them.

† Sharaf Námah, Nuz-hat-u-l-Kulúb.

‡ They thus explain the meaning of the title Yáftah-kúh.

abode of the ruler of these wild regions. I am inclined, therefore, to recognise, in its title of Diz Siyáh, or, which has nearly the same signification, Kúh Siyáh,* the word in which originated the title of Cossæan, applied by the Greeks of Alexander to the inhabitants of these mountains. The particular tract of country, however, between Media and Susiana, bounded to the E. and W. by the river of Dizfúl and the Kerkhah, appears to be the Corbiane of Strabo;† and this title is of course identical with the Mount Charban of Pliny,‡ and the Corbrynæ of Polybius; § but to the illustration of this name I have no clue in the modern geography of the district.

The road from Khorram-ábád to Kirmánsháh has been travelled by many Englishmen, and I need give, therefore, no very detailed description. The direct road leads by the plains of Alíshtar and Kháwah to Harsín; but this is impracticable in winter from the deep snow, and the route then follows a somewhat circuitous line by the Púli-Taskan, a magnificent Sasanian bridge, now in ruins, which crossed the river Káshghán, and from thence, along a line of sheltered valleys, to Hulílán on the Choaspes, where it joins the road from Já'idar. The Púli-Taskan is said to be the noblest ruin in all Luri-Kuchuk. It contains an inscription which I suspect to be Cufic, but which may possibly be Pehleví, and is thus well worthy of examination. The bridge seems to have been built by the Sásánian monarchs to facilitate the line of communication between Hamadán and Susiana.

May 24th.—I left Khorram-ábád in the afternoon, and rode 3½ farsakhs to Robát.|| The road traversed an open valley for 2½ farsakhs along the course of the right arm of the stream of Khorram-ábád, and then, for another farsakh, passed among low hills to the village of Robát.

May 25th.—I made a long stage to-day of 9 farsakhs, to the opening of the plain of Kháwah. After riding 2 farsakhs among low hills richly wooded with the belút, we came upon the A'bi-Káshghán, a deep and impetuous stream, which, dividing at this point into a number of narrow branches, we passed upon I'liyát bridges of woven boughs. At another farsakh, also among hills, we descended into the plain of Alíshtar, and soon afterwards reached the A'bi-Alíshtar, a shallow river, which we forded without difficulty. The plain of Alíshtar is a vast level flat of great extent, bounded upon the E. by a noble chain of mountains, named Chihil Ná-Bálighán¶ (from a story of forty children who here suffered martyr-

* *Kúh Siyáh* merely signifies "the black hill." *Diz* is applied to a hill forming a fort.

† Strabo, p. 745. ‡ Pliny, book vi. c. xxvii. § Polyb. book v. c. xliv.

|| A caravanserai. ¶ The forty infants.

dom), which divides it from the territories of Nihawand and Burújird, and on the W. by another very lofty range, called Sar Kushtí, where the Lurs suppose the ark of Noah to have rested after the Flood. The skirts of Chihil Ná-Bálighán are covered with villages, and around them is much cultivation. The great body of the plain, however, is pasture-ground, and I'liyát encampments were scattered over its whole surface. We rode across this plain, a distance of 5 farsakhs, and, ascending some rising ground, encamped, after another farsakh, among the low hills at the opening of the plain of Kháwah.

May 26th.—I made another long march of 9 farsakhs, to Harsín. For 2 farsakhs we traversed the lower plain of Kháwah, which is a level flat like Alíshtar, and is watered by two streams descending from the mountains of Gírun (a continuation of the chain of Chihil Ná-Bálighán), and uniting at the western extremity of the plain. After crossing the second of these streams, we began to ascend the high table-land of Kháwah, which is considered to afford the best summer pasturage in Persia. The ground rises very gradually, for the space of about a farsakh, to the high downs which form the grazing-lands, and here the country is certainly very beautiful. It is everywhere broken into knolls, and intersected throughout by rivulets, at intervals of about 300 or 400 yards. The herbage is of the richest possible description; and there were probably not less than 20,000 families of I'liyát scattered about, in small encampments, with their flocks and herds grazing over the downs apparently in countless numbers. To the S.W. of this high table-land is seen the range of Báwalín, rising again; after a short interval, under the name of Sar Kashtí, and from thence prolonged to the Yáftah-kúh of Khorram-ábád. A glen upon the north-eastern face of these mountains of Báwalín contains the tomb of Bábá Buzurg, the most holy spot in Luristán; for the common Lurs have no idea of religion farther than the worship of this their national saint.

In the rich and extensive grazing-grounds of Kháwah and Alíshtar, I am inclined to recognise the plains called Nisæan, which were visited by Alexander, from Baghistane,* or Bísutún, upon his march from Susa to Ecbatana. There is no subject, perhaps, which has been treated with more confusion, by the writers of antiquity, than the Nisæan horses and the Nisæan plains. It is evident that the Nisæan horses were a particular breed, distinguished for their size, strength, and beauty, and cherished, therefore, with the most jealous care by the monarchs and nobles of Persia; and yet the blundering Greeks would wish

* Diod. Sic. book xvii. c. xi. Arrian, book vii. c. xiii.

us to believe that they abounded in countless numbers in the great horse-pastures of Media, which they would thence denominate the Nisæan plains. There is every reason to conclude that the Nisæan horse came originally from Nesá, in Khorásán, the Nisæa of the Greeks,* and that it is to be identified with some of the Turkomán breeds of the Atak, which are still distinguished throughout Persia for their superior excellence. It is not impossible even that the breed may have become partially naturalised in some of the royal studs which were pastured in the Median plains; but that the Nisæan horse was the common and indigenous native of these plains, and had increased at one time to the enormous number of 150,000, is opposed alike to reason, and to the circumstantial evidence of the historians.

With Herodotus,† who was most imperfectly acquainted with the geography of Media, originated the error of transferring to that province the Nisæa of Khorásán; and all later writers either copied or confounded his statement. Strabo alone has escaped from the general confusion;‡ he describes the great horse-pastures as extending along the whole line of Media, from the road that led from Babylon to the Caspian gates, to that conducting to the same place from Persia, that is, from Bísutún to Isfahán; and thus we at once recognise the great grazing-plains of Kháwah, Alíshtar, Hurú, Síláḳhúr, Burbúrúd, Jápalák, and Ferídún, which thus stretch in a continuous line from one point to another, along the southern frontiers of Media. Strabo nowhere says that the Nisæan plains were in the vicinity of the Caspian gates, although his epitomiser seems thus to have understood him; neither does he even apply to the Median pastures the name Nisæan—he merely states that the plains were called Hippobotos, and that, according to the opinion of some, they produced the Nisæan horses.

His name of Hippobotos I suspect to be hellenised from Síláḳhúr, which bespeaks its own derivation from Sír A'khúr, a full manger,§ and which is the most extensive and celebrated of all these grazing plains. Alexander, I doubt not, moved from his sultry camp at Bísutún to the Yaïláḳ of Alíshtar, which is even now a favourite summer residence with the rulers of Kirmánsháh, and, after remaining a month among the horse-pastures, travelled in seven marches to Hamadán. It was also from these plains, I must add, that Python brought in his supply of horses and beasts

* Strabo, p. 509. Isidore, in Hudson, p. 7. † Book vii. c. 21.

‡ Strabo, p. 525. This passage has been often misunderstood: I follow the translation of the French Academy.

§ The letters *l* and *r* are constantly confused in Persian names.

of burden to the camp of Antigonus,* in the adjoining district of Khorram-ábád, after the perilous march of the Grecian army through the mountains of the Cossæans. We travelled for 4 farsakhs across the rich downs that I have described, and then descended into a hilly country, intervening between Kháwah and Harsín. This was the frontier district of Luristán and Kírmánsháh; and, as I have now finished my geographical remarks, I will endeavour, before I bid adieu to the province, to give a slight sketch of the manners and general statistics of the tribes that inhabit it.

Luristán is divided, as I have stated, into two provinces, Luri-Buzurg, and Luri-Kuchuk. The inhabitants of Luri-Buzurg are now classed under the general title of Bakhtiyárís, but originally this name merely applied to a small tribe, one of the twenty-six distinct clans among whom the province was divided. The Bakhtiyárís, with their dependencies, number at present 28,000 families; they comprise, exclusive of dependencies, three divisions, the Haft Lang, the Chahár Lang, and the Dínárúnís. Their assessment is fixed at 100 Kátirs (mules), the term Kátir, however, being merely conventional, and used to denote a sum of money; which is increased or diminished according to the prosperous state of the tribes, and the power of the Persian government to exercise authority over them. The institution of this assessment is very ancient, and in the time of the A'tábegs, when the province was in its most flourishing state, a Kátir seems to have been equivalent to 1000 Tómáns—at present it is valued at 100 Tómáns; but the government for many years has been unable to realise this amount, or even, upon an average of 20 years, a moiety of it. The following table describes the general distribution of the clans, and their respective assessments:—

* Diod. Sic., book xix. c. ii.

GREAT DIVISIONS.	TRIBES.*	Number of Families.		RESIDENCE.		Assessment in Mules.		Assessment in money; the mule being valued at 100 Tómáns.		REMARKS.
		Of each Tribe.	Of each Great Division.	Summer.	Winter.	Per Tribe.	Per Great Division.	Per Tribe.	Per Great Division.	
Haft Lang	Ulakí and Mál Ahmedí	400	..	Jápalák and Sílákhúr	Sar Dasht, & Plains about Dizfúl	5		500		The famous hill-fort of Diz belongs to this tribe.
	Bukhtiyáríwand	600				10		1000		
	Duraki	4000	..	Chahár Mahal		15		1500		This tribe is under the government of Burújird.
	Sallakí	2000	..	Burbúrúd		10		1000		
			7000				40		4000	
Chahár Lang	Kunúrsí	1000		Ferídún and about Zardah Kúh	Rám Hormúz, Jánnikí-Garmasír, and Plains about Shuster	6		6000		Mohammed Tákí Khán, who has all these other tribes under his sway, is a Kunursí.
	Suhúní	1500				8		8000		
	Mahmúd Sáleh	1000	..			6		6000		
	Mogúi	500				6		6000		
	Memíwand	4000				8		8000		
	Zallakí					6		6000		
			8000				40		4000	
Dínárúní	Báwái	3000	..	Bázuft	Súsan and Mál Amír	10		1000		Dinárún contains a great number of villages, and a small part only of these tribes are Nomadic.
	Urak and Shaluh	2500				10		1000		
			5500				20		2000	
Dependencies. Jánnikí-Garmasír		..	4000	Hills of Mungasht	Bághi-Malik and about Túl	..	..	..	2400	In both these divisions half the numbers are Dih Nishíns, who do not emigrate at all.
Jánnikí-Sardasír		..	2000	Gandomán & Lurdagán	Valley of the Kuran	..	..	..	800	Lurdagán, in Jánnikí-Sardasír, is a very large village; perhaps even it may be called a town.
Gunduzlú		..	1500		Gulgír and Baitáwand	..	..	..	1700	This is an Afshár tribe, transplanted into this country by Nádir Sháh. They are notorious thieves.
			28,000			100	100		14,900	

* These are probably the Silacenses of Strabo; they are one of the original tribes of Luri-Buzurg, and the name may be derived from Soloce, the ancient title of Seleucia or Manjanik.

The main power of the Bakhtiyárís, as will be seen by this table, lies in the hands of Mohammed Táki Khán, the chief of Jánnikí, who is a lineal descendant of 'Alí Mardán Khán, the Bakhtiyárí king of Persia, in the times of anarchy that succeeded the death of Nádir. At the outset of his career he was the acknowledged chief of his own single tribe, and he owes his present powerful position solely to the distinguished ability with which he has steered his course amid the broils and conflicts of the other tribes. The clans, one by one, have sought his protection and enrolled themselves among his subjects; and he can now, at any time, bring into the field a well-armed force of 10,000 or 12,000 men. He collects his revenues according to no arbitrary method, but in proportion to the fertility of the districts, and the prosperous state of his villages and tribes. He has done everything in his power to break the tribes of their nomadic habits, and to a great extent he has succeeded. In Ferídún he has purchased very extensive lands, where he has founded numerous villages, and in the plain of Rám Hormuz, which he farms of the Shíráz government for 3000 Tómáns annually, he has also settled a vast number of peaceful colonists. The Bakhtiyárís pursue a certain extent of traffic. They exclusively supply Khúzistán with tobacco from Jánnikí: they also export a small quantity of grain; and the Isfahan market is furnished, during the summer, with mutton, almost entirely from the Bakhtiyárí flocks: the cherry-sticks, for (Chibúk) pipes, which grow in profusion among their mountains, would also prove to them, if steadily pursued, a most lucrative line of traffic. Charcoal, gall-nuts, gum mastic, and the sweetmeat named Gaz, or Gazú,* form the only other exportable articles, I believe, which their country affords.

The Haft Lang tribe, who formerly doubled the number of the Chahár Lang, have been the victims of their never-ending conflicts with each other. For many years, during the reign of the late Sháh, they were the terror of Kafilahs, and at one time, indeed, threatened to put an end to the traffic between the south of Persia and the capital. They have not become in any way divested of their predatory habits, but intestine quarrels have not of late left them leisure to indulge in them. The constitution of the Bakhtiyárí system of clanship is quite distinct from that of the tribes of Luri-Kuchuk: in the one, each tribe has its acknowledged chief, who rules over his particular subjects with despotic sway: in the other, the great tribes have no regular head, but

* The Gaz, or Gazú, which is much used for making sweetmeats in Persia, is a glutinous substance, like honey, deposited by a small green insect upon the leaves of the oak-tree. See Diod. book xvii. c. viii. [It is the manna of the chemists.

each petty subdivision is governed by its own Tushmál, and they all meet as equals on great occasions, to discuss their common interests. It is true that Mohammed Táki Khán has exerted himself much to break the control of these feudal dependents; but the tendency of his system is merely to merge the power that was before separately exercised into the consolidation of his own individual authority. The great wealth of the Bakhtiyárís, as is the case with all nomadic tribes, consists in their flocks and herds. They are naturally most averse to agriculture, and until the last 15 or 20 years they always migrated in a body to the warm pastures of Khúzistán, on the approach of winter, and at the return of spring again moved back to their Yaïláks around Zardah Kúh, and along the northern skirts of the great range, from Isfahán to Burújird.

In matters of religion they are lax, but still they are outwardly Mohammedans, and neither respect nor understand the mystical tenets of the 'Ali Iláhís. Their language is a dialect of the Kurdish, but still differing in many respects, and more particularly in their method of pronunciation, from any of the other modifications of that tongue which are spoken by the different tribes extending along the range of Zagros. I believe them to be individually brave, but of a cruel and savage character; they pursue their blood feuds with the most inveterate and exterminating spirit, and they consider no oath nor obligation in any way binding, when it interferes with their thirst of revenge; indeed the dreadful stories of domestic tragedy that are related, in which whole families have fallen by each others' hands (a son, for instance, having slain his father, to obtain the chiefship—another brother having avenged the murder, and so on, till only one individual was left), are enough to freeze the blood with horror. It is proverbial in Persia, that the Bakhtiyárís have been obliged to forego altogether the reading of the Fátihah,* or prayer for the dead, for otherwise they would have no other occupation. They are also most dexterous and notorious thieves; indeed, I have myself seen instances of their dexterity in conveying a horse out of a stable, in an inner court, which was particularly watched, and padlocked, moreover, with a chain, for security, that, unless I had witnessed, I could not possibly have believed. Altogether they may be considered the most wild and barbarous of all the inhabitants of Persia; but, nevertheless, I have passed some pleasant days with their chiefs, and derived much curious information from them.

* The first chapter of the Korán, used by the Mohammedans much as the Paternoster was anciently used by us. Most Turkish epitaphs end by the words, "*Fátihah rúhun ichún.*"—"Say a Fátihah for his soul."—F. S.

The tribes of Luri-Kuchuk are far more numerous than the Bakhtiyárís; with their dependencies they number 56,000 families. The assessment of the tribes of Písh-kúh is fixed at 120 Ḳátirs, or mules, but the distribution fluctuates at the discretion of the Persian governor; the tribes of Pushti-Kúh and the dependencies are not included in this arrangement, but have a separate amount of revenue assigned to them.

The valuation of the Ḳátir varies, as with the Bakhtiyárís, according to the state of the province; but under the late Wazír, Mírzá Buzurg, who administered the revenues with eminent success for about 10 years, it was raised to the rate of 200 old Tómáns, or 333⅓ of the present currency; the 120 Ḳátirs were therefore equivalent to 40,000 Tómáns, and the amount annually realised from Písh-kúh alone rather exceeded than fell short of this sum. The following table exhibits the classification of the tribes, and the revenue system, as observed by Mírzá Buzurg.

GREAT DIVISIONS.	TRIBES.	SUBDIVISIONS.	Number of Families. Of each Tribe.	Number of Families. Of Great Divisions	Residence. Summer.	Residence. Winter.	Assessment of Great Divisions.	REMARKS.
Písh-kúh	Dilfán	Kákáwand Yíwetiwand Múmináwand Raisáwand Bíjináwand Chuwárí	15,000		Kháwah Hárásim Kháwah	Hulílán Hulílán Dujálí and Kúh Dasht Rúdbár Chárdawer Terhán		The Yíwetiwands and Múmináwands supply at present a body of 350 infantry to the crown.
	Sílásilá	Hasanáwand Kulíwand Yúsufáwand	15,000		Alishtar and Kháwah	Jáidar Seïmarrah Pushti-Kúh		
	Bálá Giriwá	Reshnuh Sákí Pápí Dirikáwand	6,000	38,000	Táf, near Khorram-ábád Abistán Sar Hurú Kúhi-Haftád-Pehlú	Kír-A'b, and plain of Lur Kerkí, Mángerrah, and plain of Rezá	40,000	The distribution of this sum of 40,000 Tómáns varies yearly, and it is impossible therefore to give the details. The 'Amalah tribe, however, who are offsets of all the other tribes, and were employed by the former Wális as their immediate servants, are very lightly charged, the cultivation of the crown lands being accounted in lieu of taxation.
	'Amalah	Kushkí Zíwahdár Umráí Miiákhúr Kátirjí Gholám Mo'timad Rukruk Zulah	2,000		These tribes are Dih Níshins, who cultivate the Khálisah, or crown lands, at Khorram-ábád, Seïmarrah, Terhán, and Kúhdasht. They do not migrate at all.			
Pushti-kúh	Faili	Kurd Shauhán Mehakí Chahár Sitún Dínáríwand	12,000	12,000	Yailáks of the range of Kebír-kúh, both on the N.E. and S.W. faces.	Sirwán, Jistán, Bádráí, and plains of A'bdánán.	15,000	The Wálí of Pushti-kúh has the sole direction of his own revenues, and claims to account personally with the Kirmánsháh government for the assessment of his district.
Dependencies.	Bájilán	Dálwand Sagwand*	900 1100 } 2000	4,500	Hurú	Plains of Sús, and beyond the Kerkhah to Deh Lurán	2,000	These tribes are refugees of the last century from the vicinity of Mosul. They are lightly taxed, having to furnish a body of 1200 horse to the crown.
	Bairánawand	'Alíwand Dushíwand	1500 1000 } 2500					
	Hulílání	O'smánáwand Jalálawand Dájíwand Bálawand Surkhámerí	500 500 200 100 000	1,500	Hills adjoining Hulílán	Plain of Hulílán	3,500	These tribes are now usually included in Kirmánsháh. They furnish 500 infantry.
				56,000			60,500	

* This is the only tribe of Luristán in whose name any similitude is to be detected to the Sagapeni of Strabo; but as the Sagwand is a stranger tribe, no weight can be attached to the resemblance of the titles.

The sum realised from the tribes thus amounted to 60,500 Tómáns; but the government possessed another source of revenue in the town of Khorram-ábád and the crown-lands scattered over the province, according to the following list:—

Names of Districts.		Taxation in Money.	Taxation in Grain.	Remarks.
		Tómáns.	Kharwars.	
Khorram-ábád	Revenues of town . .	5000	..	This consists of the rent of shops, gardens, orchards, mills, and the customs.
	crown-lands	2000	2000	
Seïmarrah		2000	2000	
Jáïdar		1000	500	
Alishtar			1000	
Kúh-dasht		230	200	
Terhán		500	700	
Kír A'b.		100	500	
		10,800	6900	

If we reckon the Kharwar of grain at one Tómán, which is the usual valuation in Luristán, this will give an addition to the revenue of 17,700 Tómáns, and raise the whole amount which may be annually realised from the province to 78,200 Tómáns. The system of revenue in Písh-kúh is very simple: when the 120 Kátirs have been duly distributed among the tribes and their subdivisions, in a general council, and to the satisfaction of all, each subdivision determines the amount of share to be paid by the different camps of which it is composed, and then the Rísh Safíd* of each encampment collects from the different families under his rule, according to his knowledge of their individual ability to contribute. But in a wild country like this, where many of the tribes live in a state of open rebellion, and will not attend to the distribution apportioned by the general council, the governor would certainly fail in his contract with the crown, unless he had indirect means of raising an extraordinary revenue to make up for the many defalcations. Mírzá Buzurg, therefore, introduced an extensive system of fees and fines; and, where robberies and murder were of almost daily occurrence, he did not want opportunities of exaction: indeed, he is said to have realised about 20,000 Tómáns annually in this manner, and that, too, without cruelty or injustice.

Luri-Kuchuk is far more capable of sustaining a heavy taxation than the Bakhtiyárís, for, though agriculture is equally neglected,

* Literally, "grey-beard," the head of each petty encampment.

it has other valuable sources of profit. The principal of these is its breed of mules, which are esteemed by far the best in Persia. It certainly exports on an average 1000 of these animals annually; and, taking the mean price at 20 Tómáns, this alone will give a sum of 20,000 Tómáns of yearly produce. The Iliyát drive a considerable traffic, also, in carpets, hurs, or packing-bags, and all descriptions of horse-furniture: they exclusively supply the towns of Hamadán, Nihâwand, and Burújird with charcoal, and their flocks and herds likewise afford them a considerable profit.

The great tribes of Písh-kúh, as I have already mentioned, have no single chief like the Bakhtiyárís; neither, indeed, have the subdivisions in general: some four or five Tushmáls are usually associated in the government of every subdivision; and on great occasions all these Tushmáls meet as equals, and consult; so that their internal constitution, which I believe to be very uncommon among the clan nations of Asia, more nearly assimilates to the spirit of a confederated republic than of a great feudal aristocracy. The Wálí of Pushti-Kúh, alone retains the kingly power of his ancestors. Among the Lurs most of the offices of labour are performed by the women: they tend the flocks, till the fields, store the grain, and tread out that which is required for use. The men content themselves with sowing and reaping, cutting wood for charcoal, and defending their property against the attacks of others. The carpets, the black goats'-hair tents, and the horse-furniture, for which Luristán is famous, are almost all the work of the women. The men seem to consider robbery and war their proper occupation, and are never so well pleased as when engaged on a foray.

The language of the Lurs differs but slightly from that of the Kurds of Kirmánsháh, and a person conversant with one dialect will perfectly understand the other. These dialects of the mountaineers of Zagros have been hitherto assumed by all writers as remnants of the ancient Pehleví; but it appears to me on insufficient grounds: I regard them as derived from the old Fársí, the Farsí-Kadím, as it is called; which was a co-existent, but perfectly distinct language from the Pehleví, in the age of the Sásánian monarchs: certainly the Pehleví, as we read it at the present day, upon inscriptions and in books, does not possess any analogy with the Kurdish, and I doubt if any dialect of it now exists as a spoken language, except among the Gabr colonies, and in a few detached villages of Azerbaïján.*

The religion of the tribes of Luri-Kuchuk is very curious, and well merits to be attentively observed; for, though the foundation of all 'Alí Iláhism is the same, consisting in the belief of a

* In the village of Dizmár, in particular, the vernacular dialect is certainly Pehleví.

series of successive incarnations, yet they have superinduced a number of local superstitions, apparently of remote antiquity. The Lurs do not affect the slightest veneration for Mohammed and the Korán; their only general object of worship is their great saint Bábá Buzurg; but there are also several holy men amongst them, who are considered the living representatives of the divine principle, and who are thus regarded, by their particular disciples, with a reverence little short of adoration. Their sacrifices and their mystical meetings form a subject of much interest; for many of their observances are certainly to be traced to a source long anterior to the institution of Mohammedanism. Macdonald Kinneir has noticed the midnight orgies of the Charágh Kushán.* I do not believe that any such rites are observed at the present day, but meetings of this nature were certainly held until within the last half-century; and there cannot be a doubt but that we may recognise in them a relic of the worship of the principles of generation and fecundity, which had descended through the orgies of Mithra and Anaïtis, from the time when Sesostris erected the emblems of the sexual organs† as objects of adoration, and Semiramis, delivering herself to indiscriminate pleasure, doubtless intended to fulfil a religious ceremony.‡ I now bid adieu to Luristán and the Lurs, as my space will not admit of any fuller remarks on this unknown and interesting people, and I proceed shortly to notice the remainder of my journey to Kirmánsháh.

The village of Harsín is distant 2 farsakhs from the frontiers of Luristán, at the foot of a long but open pass, which conducts from the high lands adjoining the plain of Kháwah. The village, containing 300 houses, is situated in a well-watered and well-cultivated valley, which, being Khálisah, or crown-land, is farmed for 3000 tómáns annually; there are here some Sásánian remains, which I believe have never been described. The fort in the village is built upon the site of a palace, apparently left unfinished; the foundations, composed of massive blocks of hewn stone, are still in tolerable preservation; several broken pillars and plain capitals are strewn about, and the remains of an aqueduct are also visible. This aqueduct, derived from the spring-head of the river, distant about half a mile, was formed entirely of large blocks of hewn stone, cemented closely together, and enclosing the channel for the water; within the palace it was raised again to its original elevation, forming a prolonged syphon from the river-head, and thus affording a rather curious specimen of the superiority of the hydraulic skill of

* "The putters out of lights"—literally, lamp-breakers.

† Diod. Sic., book i. chap. iv. Herod., book ii. chap. cii. cvi.

‡ Diod. Sic., book ii. chap. i.

Persia in those days over the present works of the same class, which are most imperfectly understood. At the spring-head a large surface of rock has been smoothened, preparatory to the sculpture of tablets, but I could not perceive that any design had been actually commenced; in front of this also a reservoir has been excavated in the solid rock, and at a short distance is seen an immense oblong slab of stone 12 feet high, 6 feet in width, and 1½ in thickness, which has been pierced by an arched doorway 8 feet high, and 4 broad, and which was probably intended for the gate of the palace; near the spring there are a great number of hewn blocks of stone scattered about, intermingled with the ruins of the aqueduct, with broken shafts, and with some bases and capitals. The Sásánian ruins in this district of Bísutún are of a perfectly distinct character from those of the same age that are met with in other parts of Persia. The buildings were evidently erected after a Grecian model; they were formed of huge blocks of hewn stone, and were adorned with bases, shafts, and capitals, according to the prescribed rules of architecture. I see no reason, therefore, to doubt the tradition which ascribes them to the age of Khusraú Parvíz, when that monarch returned victorious from his Syrian campaign, and brought with him a great number of Grecian artisans, whom he afterwards retained in his service.

May 27th.—I marched 9 farsakhs to Kirmánsháh; after crossing a rocky range of hills for 2 farsakhs, the road descended to the valley of the Gámásáb river; the ford upon the direct road to Kirmánsháh was not practicable, and we were obliged, therefore, to proceed one farsakh up the river to Bísutún, where with some difficulty we at length managed to effect a passage. In the plain upon the left bank of the river there are some more Sásánian antiquities, which I examined upon another occasion. At a spot called Takhti-Shírín, distant about one farsakh from the ford, there are the ruins of a palace, or fire-temple; a confused mass of broken pillars and large blocks of stone are scattered about on the surface of a large mound, which seems to have been formed of the debris of the edifice; a plain slab of white stone, 8 feet in length and 5 in breadth, lies amid the ruins, but on the side exposed to view it presents no inscription or sculpture whatever. The Kurds, indeed, believe that there is a telism,* as they call it, on the other side, but I never met with any one who had seen it; and it would be a work of some labour to dig out the slab, now half imbedded in the soil, and turn it over, so as to expose its lower face. Half a farsakh beyond the Takhti-Shírín is the village of Sermáj, at the foot of the Kúhi-Harsín, on its

* Almost every inscription or sculpture is called by the Kurds a telism, or talisman.

northern face, where there are ruins of the same appearance as those at Harsín, but of less extent; a modern mud fort has been built upon the site of the chief edifice, and the hovels around it conceal the greater part of the ruins. Opposite to the great rock of Bísutún are the ruins of a Sásánian bridge, across the river of Gámásáb, of which the buttresses now alone remain; it is named the Púli-Khusraú, and seems to have been built at the same time as the palaces in the neighbourhood. The appearance of the antiquities of Bísutún itself has been described by many writers on Persia, and I need only occupy myself, therefore, with its comparative geography. D'Anville, I believe, first suggested the identity of this place with the Baghistane of the Greeks; and, although this has been sometimes disputed, I shall endeavour to show such evidence as must prove the truth of his position.

We have three ancient notices of Baghistane: one where Diodorus copies the account which Ctesias gave of the arrival of Semiramis at this place, on her march from Babylon to Ecbatana; * the second occurring in the march of Alexander, by the circuitous track of Máh-Sabadán, from Susa to Ecbatana, described by the same author; † and the third, in the itinerary of Isidore of Charax, where he mentions the city of Baptana, situated in the district of Cambadene, between Carine and Concobar, on the high road from Babylonia to Media.‡ If we assume the identification of the Ecbatana of Media Magna with Hamadán (and, in spite of the objections raised against this illustration, it is, I believe, to be demonstratively proved,) these three geographical indications will unite to verify the position of Baghistane at Bísutún. Semiramis traversed Bísutún in her way to Chaone, or Kangáwar, where she instituted the worship of the generative principle, and erected the magnificent palace, which, in the days of Isidore of Charax, had been converted to a temple of Anaïtis, and of which the ruins still exist. Alexander, also, from Celonæ (Sarwán, or Keïlún) pursued the route through the plains to the foot of Zagros, and, there joining the Babylonian high road, proceeded along it to Bísutún, from whence he visited the horse-pastures of Kháwah and Alíshtar. But the evidence of Isidore is the most distinct; I have been able to verify every position, almost every mile of measurement, in his itinerary, from Seleucia to Apobatane, or Hamadán. His Carine is, of course, Kirind, and his Concobar, Kangáwar; and between these intervenes Baptana, or Bísutún. The name of Cambadene, applying to the district, is also to be illustrated, for the tract of country adjoining Bísutún,

* Diod Sic., book ii. chap. 1. † Book xvii. chap. 11.
‡ Isidore, in Hudson, vol. ii. p. 6.

on the left bank of the Gámásáb, retains to the present day the title of Chamábatán.*

Etymologically considered, the coincidence is even more striking. Bághistán signifies the place of gardens; and the name appears to have been given from the famous pleasure-grounds, ascribed traditionally to Semiramis. Bóstán has the same signification, and is only a contraction of the former word; and the great range of mountains, bounding the plain of Kirmánsháh, and called in the geographers Jabali-Bísutún, preserve in the Táki-Bóstán, at one extremity, the title, which at the other has been corrupted into Bísutún. But this name of Bóstán appears at one time to have been further corrupted into Batán, and thus the Baptana of Isidore is Bá Patán (the common contraction for Beth Patán), signifying the city of Patán, or Batán; whilst his Cambadene, also, is Cham Batán, the river of Batán, which, with a different explanation † for the word Batán, is universally allowed by the Kurds to be the derivation of the title of the district.

The descriptive evidence now remains. The precipitous rock, 17 stadia high, facing the garden, the large spring gushing out from the foot of the precipice and watering the adjoining plain, and the smoothening of the lower part of the rock, all convey an accurate idea of the present appearance of Bísutún; but what are we to say of the sculptures of Semiramis, and the inscription in Syriac characters? There are only two tablets at Bísutún,—the one now nearly destroyed, which contains a mutilated Greek inscription, declaring it to be the work of Gotarzes; the other a Persepolitan sculpture, which is adorned with nearly 1000 lines of Cuneïform writing, exhibiting the religious vows of Darius Hystaspes, after his return from the destruction of Babylon, on the revolt of its Udpati, or Governor, Nebúkadrazzar, the son of Nebúnít.‡ We have no reason to suppose that either of these can represent the sculptures ascribed to Semiramis; for Ctesias, a Greek, could not possibly have misunderstood the Grecian tablet, even supposing that it existed in his time, which is scarcely probable; and, as he lived at the court of Artaxerxes Mnemon, it is not likely that, in the space of a century after the

* The Greeks having no soft *ch* were obliged to employ k; d and t were used indifferently in the old Persian; and we find the Greek *ην* answering in most names to the modern termination in *an*, as *Ardekán* for *Articene*, *Másabadán* for *Mesobatene*, *Khâwarán* for *Choarene*, &c.

† They pretend that *Cham Batán* means "*the river of ducks*," but it is more probable that Batán is a proper name.

‡ *Nebúnit* is, of course, the *Labynet* of *Herodotus* and the *Nabonid* of the canon of *Ptolemy;* but we are not informed in history of the name of this monarch's son, who revolted against *Darius Hystaspes.*

death of Darius Hystaspes, the proud memorial of that monarch should have been transferred to the remote ages of Semiramis. Yet Isidore also mentions the statue and pillar of Semiramis, at Baptana: and I am inclined, therefore, to solve all difficulties, by supposing that this sculpture did really exist upon the lower part of the rock, which was scarped by the Assyrian Queen; and that Khusraú Parvíz, when he was preparing to form of this long scarped surface the back wall of his palace, and for that purpose began to excavate deeper into the mountain, destroyed the sculptures, and removed all further trace of them. With regard to the pillar of Semiramis, it is not a little curious also that an Oriental writer of the 13th century * should describe the rock of Bísutún, from his own observation, as though it were sculptured into the form of a minárah or minaret. There is certainly, at present, nothing resembling what we should call a pillar or minaret; but whether a pillar did at one time really exist, or whether the name was improperly applied to the mere smoothing of the rock, there is every probability that the *στήλη* of Isidore, and the *menárah* of Zakariyá Kazvíní, refer to the same object.

That the ruined buildings at Bísutún are of the Sasánián age is proved by a capital, sculptured in its peculiar style, as well as by some words in the Zand character engraved on several of the blocks of stone; and it is on this account that I ascribe to the same era all the remains of a similar class which are met with in the neighbourhood.

I must now mention the Greek inscription of Gotarzes; and this is so difficult a subject that I shall not pretend to decide on its illustration. The mutilated tablet of colossal figures is well known, from the descriptions of former travellers; but they do not seem to have paid much attention to the inscription: the only words that can be now made out are—ΑΛΦΑΣΑΤΗΣ ΜΙΘΡΑΤΗΣΠΕΓ, and then, after an interval, ΓΩΤΑΡΖΗϹ-ΣΑΤΡΑΠΗΣ ΤΩΝΣΑΤΡΑΠ, where the inscription is broken off: the words ΓΩΤΑΡΣΗϹ ΓΕΟΠΟΘΡΟΣ are also found in a corner of the tablet. Now *Geopothr* is certainly the Zand compound *Gívputr*, the son of Gív; and we thus recognise the name, famous in Oriental tradition, of Gúdarz Ibn Gív; but who this Gúdarz Ibn Gív may be, it is not easy to say. There are two personages of the name of Gúdarz to whom the tablet may possibly relate; and I shall briefly state the claims of one and the other. The Gúdarz of Persian fable was a celebrated

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* *Zakariyá Kazvíní*, in his two works, the *Athâru-l-Buldán* and *'Ajayibu-l-Makhlúkát.*

general during the reigns of Kaï Káús, and Kaï Khusraú. He is better known as the father of Gív than as his son; but still I have in one work found him expressly called Gúdarz Ibn Gív;* and such is the name which is always applied to him among the I'liyát of Kirmánsháh, where traditions regarding him abound. The Alphasates of the inscription (*l* and *r* being used indifferently in old Persian) would seem to be the same name as the Arphaxad of the Apocrypha, and the Arfah-zád of the Persians, who is considered identical with Kaï Káús; and the name belongs therefore to a high antiquity. The tablet also, to all appearance, is far more ancient than the sculptures upon the same rock which date from the age of Darius Hystaspes. Against all this it is urged that we have no evidence whatever of the existence of such a hero but Persian fable and tradition; and how a Greek inscription should have found its way into Persia, anterior to, or at least coeval with, the elder Cyrus, it is most difficult to conceive. There are three letters also made use of in the inscription, Z, H, and Ω, which are supposed to have been introduced into Greece by Simonides about 500 B.C., and it is barely possible, therefore, that they could have been employed in Persia to commemorate this general of the Kaïánian monarchs.

The second Gúdarz, to whom the inscription also may relate, is the Arsacide Gotarzes. Josephus declares this king to have been the son of Artabanus,† the founder of the lower Arsacide dynasty; but Tacitus, who is better authority, makes him his brother,‡ and does not mention the father's name, which thus may possibly have been Gív; and indeed this may be the very personage whose exploits have been removed by the Persians to the fabulous ages of Kaï Khusraú. Gotarzes, the Arsacide, as I have already shown, appears to have fought his great battle with Meherdates in this plain, intervening between Bísutún and Kirmánsháh; and indeed the very name Mithrates may possibly be the same as the Meherdates of Tacitus, though, as the one name is pure Persian,§ and the other corrupted, this is hardly probable: and, lastly, though I have very little experience in Greek inscriptions, yet the alphabet employed appears to me to be far more conformable to the age of Claudius than to the remote period of Cyrus. The arguments against this illustration are, that the Arsacide Gotarzes is never named Ibn Gív in the Oriental histories; that, as the great king of Parthia, he would

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* In the Sharaf Námah.

† Josephus, Ant., book xx. c. iii. s. 4. ‡ Ann., book xi. c. viii.

§ Mihrdád, given by Mihr, Mithra, or the sun.

hardly have taken the inferior title of Satrap of Satraps; and, lastly, that it is impossible for any one, looking at the two tablets together, to believe the Greek one to be five centuries posterior to the other. Perhaps, after all, Gúdarz Ibn Gív may have been neither the one nor the other of these heroes, but a mere provincial governor, who attained some local celebrity; and I believe that there is a satrap of the name of Gotarzes mentioned by the historians of Alexander, though I cannot now refer to the particular passage. At any rate, however, from the great celebrity of the first Gúdarz in Persian romance, the history of this inscription must be an object of interest equally to the oriental and classical scholar.

The distance from Bísutún to Kirmánsháh is 6 farsakhs, the direction being due W. At 2 farsakhs from Bísutún are found the remains of another palace, which I suppose to have been Sásánian: some eight or nine bases and capitals, scattered over the plain, are all that are now to be seen; but the space between the first of these ruins and the last is about 300 paces, and if they belonged therefore to the same building, which is probable from the appearance of the intervening ground, it must have been of very great extent.

The Táki-Bóstán, of which accurate drawings have been published, is about 1½ farsakh to the right of the road. The sculpture at this place is the finest in Persia, and is evidently the work of Grecian artists. The Pehleví inscriptions have been deciphered by De Sacy,* and for the last forty-five years his translations have been allowed to stand unimpeached. Owing to the faulty copies, however, which he inspected, he has made many mistakes: four or five words in each inscription are erroneously rendered, and in one he has actually mistaken the name of the king in whose honour the inscription was engraven. The left-hand inscription he concludes correctly to relate to Shápúr Dhú-l-aktáf; but the other, which he attributes to Bahrám Kirmánsháh, refers in reality to his brother Shápúr.†

I hope, on some future occasion, to give to the public a more detailed account of the antiquities of this part of Persia than I have been able to embody in this hasty abstract.

* Ant. de la Perse, p. 243.
† He has mistaken the name Shahpúhri for Varahrán.

III.—*Notice of a few Observations which it is desirable to make on the Frozen Soil of British North America; drawn up for distribution among the Officers of the Hudson's Bay Company.* Communicated by Dr. Richardson, F.R.S., Physician to the Royal Hospital at Haslar.

Travellers into the arctic regions of Asia and America have mentioned that the sub-soil of certain districts is permanently frozen, and Gmelin long ago declared that, in Siberia, the thickness of the frozen earth was upwards of 100 feet; but these statements were either overlooked or disbelieved until very recently, when Professor Baer of St. Petersburg, and Mr. Erman of Berlin, transmitted to the Geographical Society of London some account of the sinking of a well at Yakutsk to the depth of 382 feet in the frozen ground. The temperature was found to increase gradually with the descent of the pit, and at the bottom it had risen from 18° Fahrenheit (−7.8 Cent.), which is the mean annual heat of the place, up to the freezing point; and the soil, which in the upper beds was solidly frozen, had become so loose, that the shaft could not be carried lower without timbering. These facts, when made known to the scientific world, excited great attention, particularly when viewed in connexion with certain opinions entertained respecting the heat of the interior of the globe, and in relation to numerous observations made in the mines of Europe, whence an average augmentation of one degree of temperature of Fahrenheit's scale, for every 45 feet of depth, has been deduced: this rate of increase is about one-third slower than that at Yakutsk.

The inquiry is to be prosecuted still further in Siberia; and Professor Baer suggests that it would be desirable to collect information from the officers of the Hudson's Bay Company, as to the extent of the layer of frozen ground in North America, the thickness it attains in different parallels of latitude, and how much of it disappears towards the latter end of summer; and the council of the Geographical Society, desirous of promoting so important an inquiry in the department of Physical Geography, have requested the following instructions to be drawn up, and, with permission of Governor Pelly, to be circulated, for the guidance of the Chief Factors, Chief Traders, and Clerks of the Hudson's Bay Company, who may be desirous of contributing to the advancement of science by their observations.

As it is not likely that occasions for sinking deep pits or wells in the Hudson's Bay countries will speedily occur, the thickness of the frozen crust cannot be ascertained in the same direct manner as at Yakutsk, but the depth to which the summer thaw penetrates may be noted without much trouble. Sir John Franklin mentions that, at York Factory, in lat. 57°, this did not exceed 3 feet; and on

the shores of Great Bear Lake it was only 22 inches. The best time for observing to what depth the soil has been thawed by the summer heat is in "the fall," or the commencement of winter, when the surface begins to freeze again and the snow to lie, that is, early in October, about the 56th parallel, and in the month of September farther north. Every locality where frozen sub-soil is discovered by digging in the summer should be mentioned, so that, when observations are sufficiently multiplied, the southern boundary of the frozen stratum may be traced on the map. And if spots be found in the higher latitudes without any such frozen bed, the peculiarities of its situation should be recorded, particularly those which render its drainage more perfect, or contribute to elevate its summer temperature, such as the presence of decomposing beds of bituminous shale, producing pseudo-volcanoes, the vicinity of thermal springs, or the reflection of the sun's rays from lofty walls of rock. [The very high summer heat of some narrow valleys in the north of Sweden has been attributed to the latter cause.] The nature of the soil, whether clayey or sandy, retentive of water or porous, should also be noted. Sandstones, apparently hard and compact, dug up on the banks of Mackenzie's river, were found to thaw and crumble into moist sand when laid before a fire. If time admits of it, several openings may be made in the same neighbourhood, and the mean depth of thawed soil obtained, or the results may be recorded in a tabular form.

It is scarcely necessary to remark that, for the attainment of the object in view, it is desirable to have as many facts as possible, and that the names of places where the soil thaws perfectly every summer should be as carefully transmitted as those where the thaw penetrates only a few inches. Many facilities for observation will occur when gentlemen are travelling from their winter-quarters to the depôts, and if the latitude of the place be not exactly known, its distance from some post marked in Arrowsmith's map may be mentioned. As these journeys or voyages are made on the larger rivers, whose banks are liable to be inundated by spring floods, and to be covered by water for some time, when observations are taken in such places a memorandum to that effect should be made.

There are several reasons for supposing that, in the interior of the Hudson's Bay territories the climate is nearly the same as that of Siberia, and we know that on the northern shores of Great Slave Lake, in lat. 62°, which is the parallel upon which Yakutsk stands, the mean annual heat is very nearly the same as at the latter place. In that neighbourhood, therefore, we may expect to find the frozen soil as thick as at Yakutsk; at Fort Chipewyan, where the mean temperature is supposed to be between 29 and 30 degrees, the depth of frozen soil, by the same rule, will not exceed 60 feet; and, towards Cumberland-house, where the

average heat of the year is rather above the freezing point, the frozen sub-stratum will probably be found to feather off to nothing. Facts, in proof or contradiction of these suppositions, are required; and between Athabasca and the Saskatchewan, the frozen stratum being very thin, may be entirely penetrated with little labour, particularly at the posts of Isle à la Crosse or Lac la Ronge, or, perhaps still better, on the Peace River and its southern branches. Even in the higher latitudes, as on the Mackenzie, much information may be gained by visiting some of the recent land-slips which occur annually on the banks of the larger rivers. In such a case the height of the top of the bank from the water, the width of the slip, and the age of the crevice, whether newly formed, or the work of a preceding season, should be recorded. Cliffs, several hundred feet high, composed of crumbling rocks, washed at the base by the Mackenzie and Bear Lake rivers, are noticed in Sir John Franklin's journal. Should one of these happen to give way to the thickness of 400 feet, both vertically and horizontally, an inspection of the walls of the crevice would reveal the depth of the frozen earth as effectually as the well does at Yakutsk. Land-slips of less magnitude are more likely to take place, and are not to be neglected.

Another very interesting mode of ascertaining the depth of frozen soil in different parallels offers itself. Professor Baer quotes an incident which happened to Baron Wrangell while riding to the north of Yakutsk, in lat. 65°, over a large river; the ice suddenly giving way, he was thrown forwards and escaped, but his horse went under. He was lamenting the loss of his steed, when the Yakutskis, laughing, told him that the horse was not only safe but dry; and, eventually, when the ice was broken away, it was discovered that there was no water beneath, and that the animal was standing upon the perfectly dry bed of the river. Similar streams, fed only by superficial springs, and consequently ceasing to flow in winter, must be known to the gentlemen of the Hudson's Bay Company; but there are many large and rapid rivers also known to them, which continue during the whole winter to pour large volumes of water into the Arctic Sea. The Mackenzie itself is mostly supplied from districts having a mean heat inferior to the freezing point: its more southerly branches being comparatively small. Now, the waters which sustain the perennial course of many of the tributaries of the Mackenzie, the Great Bear Lake River, for instance, must rise from beneath the frozen stratum. Dease's River, and all the other feeding streams of Great Bear Lake, taken in the aggregate, yield, even in the summer, a much smaller quantity of water than that which is discharged by Bear Lake River; and there is no remarkable lowering of the surface of the lake in the winter,

though the stream that issues from it is too rapid to freeze, is 300 yards wide, and several fathoms deep; hence the great supply must come from the bottom of the lake itself. The depth of one of the arms of the lake has been ascertained to be about 240 feet; but, as the average heat of the year there does not exceed 14 or 17 degrees of Fahrenheit, the source of the perennial springs cannot be estimated at less than 400 feet. The ascertaining of the greatest depth of this lake may therefore be useful in guiding us to a right conclusion, and this may be still more readily accomplished by sounding smaller lakes, which give origin to streams that flow all the winter. Sir John Franklin saw many such lakes in the course of his journey, and, in most instances, there was a rapid at the point where the stream broke off from the lake. The uppermost, in a string of lakes, particularly if its feeding streams are frozen up in winter, is obviously the best for examination, Dease's River, before mentioned, flows through two small lakes, which are very likely to afford useful information, if properly sounded; and, as the intelligent and active gentleman whose name the river bears, wintered at its mouth in 1837, and perhaps will do so also in the present season, we are not without hope of learning much from his observations, though, unfortunately, he is not aware of the interest excited by Professor Baer's statement.

Notices of perennial springs, and of the rocks from whence they issue, whether lime-stone, sand-stone, or shale, are highly desirable. Several occur in the Athabasca River, where they are readily detected in winter by remaining unfrozen, or covered only by a thin crust of ice, on which account they are noted by the voyagers as halting places on their winter journeys. There is a remarkable one issuing from lime-stone, covered by a bed of shale, at the junction of Clearwater River with the Athabasca. The temperature of this spring should be ascertained, and, also, that of any other copious fountain, such as the salt springs on the Slave River, which pour out very large volumes of water.

This paper has been drawn up with a knowledge of the limited means possessed by the officers of the Hudson's Bay Company for making researches of this kind, and of the important and laborious avocations which employ their time; but much is hoped for from their zeal and intelligence. The only instruments required for ascertaining the depth of the summer thaw are a spade and a foot rule; and letters, detailing the facts ascertained, may be addressed to the Secretary of the Royal Geographical Society, 21, Regent-street, London.

[A Paper, with similar objects in view, drawn up at the suggestion of M. Arago, having been circulated by the Governor and Committee in 1835, the results of any inquiries made in consequence thereof may also be transmitted to the Secretary of the Geographical Society.]

IV.—*Note on the best Points, in British North America, for making Observations on the Temperature of the Air; and also for the Height of the Station above the Level of the Sea.* By Dr. Richardson, F.R.S.

In addition to the observations which it is desirable to make on the frozen soil of British North America, as detailed in the preceding notice, it would be a valuable service rendered to physical geography, if a series of observations on the temperature of the air, for the space of one year, could be obtained at various points throughout the Hudson's Bay territory; as well as for the height above the level of the sea of the principal points of observation. For this purpose the Council of the Royal Geographical Society, with permission of Governor Pelly, have caused twenty carefully-graduated thermometers, besides six on a larger scale, fitted with the apparatus for ascertaining the height above the sea by the boiling temperature of water, to be distributed among the officers of the Hudson's Bay territory, who are earnestly requested to lend their aid in promoting so important an inquiry.

As the paper by Colonel Sykes, which accompanies this note, fully explains the mode of making observations on the boiling temperature of water for ascertaining the height of land, it only remains to point out *where* such observations may be of the most obvious utility in the Hudson's Bay countries.

One instrument, sent to Moose Factory, would suffice for ascertaining the heights between that post and Lake Superior; and as the elevation of this lake above the Atlantic has been accurately obtained, a general verification of the instrument will thus be furnished. In returning from Lake Superior to Moose Factory, the observations should be repeated at the same spots; and if the successive differences of level of the stations are found nearly to agree in going and coming, the difference of level, if any, between the Atlantic at the mouth of the Hudson, and Hudson's Bay, may be estimated.

Three instruments may be sent to York Factory, and distributed as follows. With one the heights on the route from the Factory to Lac la Pluie and Red River, may be obtained, and if opportunities offer, the operations may be carried on to Fort William, by which the levels would be taken to Lake Superior in another direction. Another instrument intrusted to the care of a gentleman going to Edmonton House, and across the Rocky Mountains to the Columbia, would give the altitudes of the various stations between Hudson's Bay and the Pacific. And a third, taken charge of by a gentleman going to Mackenzie's River, would suffice to level the country between York Factory and the Arctic Sea.

At Lake Winipeg, the height indicated by the three instruments may be compared, and for this purpose the observations should be made on the same spot, at Norway House. At Cumberland House, the indications by two instruments may in like manner be compared. And if the instrument taken to the Mackenzie were brought back by way of the Rivière aux Liards and Peace River to the Saskatchewan, the level of the base of the Rocky Mountains would be ascertained for 18 degrees of latitude—a very great desideratum to geologists as well as geographers. Observations should be made on the banks of all the larger lakes, Lake Winipeg, Pine Island, Beaver, Isle à la Crosse, Athabasca, Slave and Bear Lakes. Also on the summit of Methy Portage, and at Frog Portage.

Two instruments, making six in all, sent by the annual vessel round Cape Horn to the Columbia, might be used for levelling New Caledonia, and obtaining the altitudes between the Pacific and the Rocky Mountain Portage, thus giving another line of verification.

In all cases the temperature of the atmosphere at the time of observation, and the kind of weather, should be recorded, along with the exact height, to tenths of a degree of the mercury in the thermometer at the boiling points.* Though the calculations may be made in the country for the satisfaction of the observer, the original notes should be transmitted for recalculation in England. Observations should be especially made at all the posts in the route, and the exact spot described, so as to be easily found by future observers.

Form of Register of Observations for Heights above the Sea.

Name of Station.	Date.	Time. of Day.	Boiling Temperature of Water.	Wind and Weather.	Temp. of Air.	Remarks.
					+ or −	

* Should there happen to be a barometer at York or Moose Factories, or at Fort William, the height of the mercury in it at the time of observation should be carefully noted.

With regard to the temperature of the atmosphere, the following posts are desirable places for keeping registers:—

	North Lat.
Fort William	48° 45′
Lac la Pluie	49 0
Bas la Rivière Winipeg	50 30
Norway House	53 50
Moose Factory	50 55
York Factory	56 20
Cumberland House	54 10
Carlton House	53 20
Isle à la Crosse	55 20
Fort Chipewyan	59 0
Fort Resolution	60 40
Fort Simpson	61 10
Fort Norman	64 45
Fort Good Hope	67 20

Were the temperature registered for every hour, all that can be desired would be obtained; but as such a register could not be conveniently kept at any of the posts for a whole year, observations four times a day may be substituted,—namely, at 2 and 8 in the morning, and 2 and 8 in the evening; or, if only two observations can be regularly made every day, 8 o'clock, morning and evening, had better be selected for the hours, and means for ascertaining the time as correctly as possible should be taken. At some of the posts there are dials, and at others a meridian line is marked; by these a watch may be corrected, taking care to apply the equation of time taken from an almanac. The thermometer should be hung up under a small shed, open on every side, supported on a central pillar, and thickly thatched with grass, or covered with brush; a board being also fixed horizontally beneath the thermometer, to intercept radiation from the heated earth.

In the Hudson's Bay countries the mean temperature for the whole year occurs in the morning at about ¼ past 8, and in the evening at ½ past 7; but 8 and 8 are selected as the nearest pair of hours. At 2 in the morning the average minimum temperature occurs, and the maximum at 2 P.M.

Register of Observations on Temperature of Air at ____________
Height above the Level of the Sea ____________

Date.	Temp. of Air in the Shade. A.M. 2	A.M. 8	P.M. 2	P.M. 8	Wind and weather.	Remarks.
1840.	+ or −	+ or −	+ or −	+ or −		
Jan. 1					N.W. Snow.	Such as,—Lake frozen over—River set fast —Ice breaking up—General thaw—Spring birds arriving—Buds breaking out — Periods of trout-fishery, &c.—Spawning-times of various fish—Wild animals bring forth their young, or rutting, &c. &c.
2					S.W. Rain.	
3					&c. &c.	
4						
5						
6						
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31						
Sums						
Means						

It is requested that the *original* record of all observations may be transmitted to Captain Washington, R.N., Secretary of the Royal Geographical Society, 21, Regent Street, London.

V.—*Memoir, to accompany a Chart of the South Coast of Arabia from the Entrance of the Red Sea to Misenát, in 50° 43′ 25″ E.* By Captain S. B. Haines, Indian Navy. Communicated by the Court of Directors of the East India Company. Read the 11th February, 1839.

Ras Bab-el-Mandeb, or the Cape of the Gate of Affliction, is a prominent cape which forms the south-western extremity of Arabia, and the north-eastern shore of the entrance into the Red Sea. When seen from the eastward the land assumes the shape of a wedge or gunner's quoin, and is visible from a vessel's deck, on a clear day, at the distance of 35 miles. Its highest peak, named Jebel Manhalí, rises to 865 feet, whence it slopes to the southward, and terminates in a low point on the sea.

Before proceeding with the narrative, I may be permitted to state that, in the following pages, it is proposed to give a description of about 500 miles of the southern coast of Arabia—hitherto almost unknown—and such an account of its population, government, and commerce, as was obtained, during the survey of these shores, by myself and the officers of the E. I. Company's ship *Palinurus*, in the years 1834, 5, and 6:—premising that the longitudes were determined by meridian distances, measured from the flag-staff at Bombay, assumed to be in 72° 54′ 26″ E., by the means of 5 and also of 8 chronometers, at different times, and by quick and direct measurements.

I am happy to have the opportunity afforded me of expressing my thanks to Rear-Admiral Sir Charles Malcolm, who has ever proved himself a generous promoter of scientific pursuit; also to my friends Lieutenant Sanders, assistant-surveyor, Lieutenants Jardine and Sheppard, Messrs. Smith, Cruttenden, Grieve, Ball, Rennie, Stevens, and Barrow, for their cheerful assistance during the survey. The late Dr. Hulton also proved a valuable auxiliary, and, I lament to add, fell a victim to his unceasing exertions throughout the progress of a tedious and trying service.

The peak of Jebel Manhalí* is in lat. 12° 41′ 10″ N., and long. 43° 32′ 14″ E. Off the extremity of the Cape Báb-el-Mandeb, numerous rocky points, projecting about half a mile from the main land, form shallow bays, affording shelter to boats and small vessels; and here the boatmen from the opposite coast of Abys-

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* The orthography of the names of places has been altered according to the standard adopted in the Geographical Journal:—*i.e.*, the consonants are to be sounded as in English, and the vowels as in Italian, or as in the English words *f*ather, th*e*re, fat*i*gue, c*o*ld, r*u*de. See Vol. vii. p. 245.—Ed.

sinia land their sheep and drive them to Mokhá, to spare themselves a tedious voyage back against southerly winds.

About 1½ mile to the north-eastward of Jebel Manhalí is a small range of hills, named Jebel Heïkah, extending about 3 miles in a N.N.W. direction, of less elevation, and of an irregular outline. The intervening land is low, sandy, and barren; but in the valley a few bushes and spots of grass may occasionally be seen, and on this scanty food I found beautiful antelopes subsisting. A little to the eastward of the cape is a square dark hill, named Turbah, on which are some ruins, and near it an old village, possibly the site of the ancient Ocelis: the steep rocky points here form a sheltered anchorage. In a valley are some old date-trees and a well of brackish water, at which the wandering Bedowíns of the Subeïhí tribe occasionally water their camels.

Jebel Manhalí and the other hills would seem to be of volcanic origin; on its summit I found the needle of my theodolite deflected several degrees from the magnetic meridian. To the northward and eastward of this small hilly district the land is low and sandy.

Returning to the straits, a small spot named Pilot Island lies about half a mile distant from the Arabian shore.

Perím, or *Meyún*, a bare rocky island, about 4½ miles long by 2 broad, rising 230 feet above the sea, lies at the distance of 2 miles from the coast of Arabia; and forms, between it and Pilot-Island, a good channel, known by the name of the Small Strait, its least breadth being 1½ mile. It possesses a good harbour on the south-western side, with an entrance half a mile wide. Here are a tank, the ruins of a rudely-constructed pier, &c.—traces of the British occupation in 1801. The needle was here deflected 3° on the rocky part of the island. Variation 5° 42′ W., in 1836. Lat. of south point of island 12° 38′ N., long. 43° 28′ 40″ E. High water, on full and change, at noon. Rise of tide about 6 feet.

Rás Seján, a cape on the Abyssinian shore, forms the southern point of entrance into the Red Sea. It is a gloomy-looking peak, about 380 feet high, projecting to the northward from the coast, with which it is connected by a piece of low land 700 yards wide, having a swampy bay, surrounded with mangrove-bushes, to the westward. The northern face of this cape is rocky and steep, but, from a small bay to the eastward, a bank runs out about 1 mile, with from 5 to 6 fathoms on its outer edge.

The distance from Rás Seján to the nearest point of the Arabian coast is exactly 14½ geographical miles, which is therefore the extreme breadth of the Strait of Báb-el-Mandeb: this is divided into two, as before mentioned, by the island of Perím;

and between the south point of this island and Cape Seján, forming the southern entrance, or Large Strait, the breadth is exactly $11\frac{1}{4}$ miles. This channel is again narrowed by a cluster of islets, called *Jezíratu-s-sab'ah*, or Seven Islands, commonly known to the English by the name of "The *Brothers*:" they are named the "Eight Brothers" by Horsburgh;* but it seems more correct to describe them as six rocky islets, extending $5\frac{1}{4}$ miles in an E. and W. direction; the highest, or north-eastern, lying $6\frac{1}{2}$ miles due E. of Rás Seján, and $9\frac{1}{2}$ miles S. of the southern point of the island of Perim.

The high Brother forms a conspicuous peak rising about 350 feet above the sea, with a small bay on its northern side abundantly supplied with turtle and fish of various kinds. The position of the peak is in 12° 28′ N., 43° 28′ 50″ E. A low rocky island to the westward is the only part which may be considered dangerous.

The western island is distant only 4624 yards from the coast of Africa, and the easternmost $7\frac{1}{4}$ miles, with soundings the whole way, varying from 6 to 25 fathoms, and a safe channel, although the currents and tide are rapid and irregular, with a rise and fall of 7 feet: the anchorage good.

The *Brothers* are of a brownish colour, the most western is certainly volcanic: they are of considerable height, and five out of the six islands may be seen from 20 to 30 miles in clear weather; the highest, perhaps 29 miles; the second, from the westward, 26 miles; and the westernmost, 22 miles; giving a height of about 350, 300, and 250 feet respectively.

The soundings in the Small Strait vary from 8 to 14 fathoms; in the middle of the Large Strait we had no bottom with 120 fathoms of line.†

The coast of Abyssinia from Rás Seján to Ras el Bír extends in a S.S.E. direction about 20 miles, being low and sandy, and covered with mangrove and brushwood; towards the interior are three or four ranges of flat-topped limestone mountains, named Jebel Ján, which reach a great elevation, and form the northern boundary of an extensive plain covered with thicket, opening out to the westward on a range of mountains named Jebel Tejúrah, which continues parallel to the sea-coast in a southerly direction. At the back of the southern bluff of Jebel Ján I discovered the remains of a large Bedowín encampment, which had been deserted by a party of the Danákilí‡ tribe of So-

* Indian Directory, vol. i. p. 233.

† A plan of the Straits, on the scale of an inch to a mile, with various views of the land, accompanies Captain Haines's Chart. For detailed sailing directions see Horsburgh's excellent work, vol. i. p. 233, and the French translation by M. le Prédour, vol. i. p. 438.—Ed.

‡ That is, people of Donkolah.—F. S.

málís, who, like the Ṣubeïḥí Arabs on the opposite coast, probably leave the sea-shore during the months of June, July, and August. The few inhabitants we here met with were wretched-looking beings of this tribe; and from them we learnt that the only fresh water was to be found near the hills, from 10 to 12 miles distant from their present habitation. Here are some jackals, foxes, and hyænas; and among the feathered tribe I saw the ostrich, pelican, flamingo, curlew, and plover.

The little village situated inland is named Tejúrah. The territory of the Danákilí tribe extends some distance along the coast, and for many miles inland. The only instance on record of a female chief being placed at the head of this tribe, occurred in 1836. The neighbouring tribes hold the Danákilí in great disrepute, generally considering them cruel, treacherous, and inhospitable.

To return to the coast of Arabia:—as before mentioned, the land to the northward of the hilly tract of Heïkah is low: the coast from Rás Báb-el-Mandeb extends in a north-easterly direction about 7 miles, when it turns abruptly E.S.E. for about 25 miles, as far as Rás 'A'rah, forming, in the bight, the bay of Ghubbet el Heïkah, which affords a convenient and smooth-water anchorage to ships working up to the straits against the strong north-westerly winds in June and July. At Sekeyyah is a group of palm-trees, and 2 miles to the eastward a well of good water; fuel is abundant. *Jebel Hejáf* is a low range of hills extending for about 16 miles in the same direction as the coast, from which they are distant about 8 miles: they are of a dark aspect, irregular in their outline, and terminate in a bluff to the westward. *Jebel 'A'rah* (Chimney-peaks of Horsburgh) is a remarkable range of lofty mountains extending in a N.W. by N. direction for about 18 miles, with an irregular outline, being a continued chain of peaks, terminating to the S.E. in a barn-shaped hill, with a peak in its centre: they have a dark, gloomy aspect, and are bounded to the N. by a higher range of distant mountains.

Along this coast are small projecting rocky points, forming little bays, with a sandy beach; towards the interior the land, as it rises towards the hills, is covered with bushes.

We met a few fishermen, looking wretchedly poor; and on one occasion a party of Ṣubeïḥí Bedowíns, fully accoutred for war. During our little excursions from the coast we saw some antelopes and hares; and it is amusing to observe the former cooling themselves on the sea-shore during the day—at sunset they disappear.

Rás 'A'rah, the southern cape of Arabia, is a very low sandy rounded point. in lat. 12° 37′ 30″ N., long. 44° 1′ 40″ E., and is one of the most dangerous capes on the coast, being in the direct route

for vessels proceeding to or from the Red Sea, and having a bank of hard sand, extending nearly 3½ miles off-shore to the eastward of it, with one or two dangerous rocky patches with only 9 feet water. In 1836 a fine Dutch ship was wrecked here, and during my service on this coast several vessels have been lost. This bank, which extends as far as Khór 'Amrán, is the more dangerous as the water suddenly shoals from 15 fathoms; indeed a ship with good headway could hardly get a second cast of the lead before touching the ground. It is advisable by day not to approach nearer than 15 fathoms, and by night into not less than 20 fathoms water.

In the bight of the small bay to the westward of Rás 'A'rah are a few date-trees and a supply of fresh water; the bay also affords shelter against the strong winds during the N.E. monsoon: the coast immediately around it is rather steep.

Khór 'Amrán is a remarkable inlet situated 13½ miles E. by N. from Rás 'A'rah, 4½ miles long from E. to W. by 2½ broad: it is almost land-locked by a narrow spit of sand which projects from the eastern shore and forms its southern boundary, leaving a very narrow entrance to the westward, with only 6 feet water; nor does this depth increase for 2 miles, when it opens out into a fine basin, having from 3 to 6 fathoms water. At high water the low southern spit of sand is nearly covered.

Jebel Kharáz, or the Highland of Sant' Antonio, reaches the height of 2772 feet above the sea at its northern peak, while its southern bluff in lat. 12° 41′ N., long. 44° 16′ E., rises 2085 feet almost immediately to the north of the basin of Khór 'Amrán. On the western side of the summit of the north peak we found a ruin of roughly-hewn stone without date or inscription, but sufficiently remarkable to give a name to this mountain, which is called Jebel Jinn, or Genii-Hill, on account of some mysterious tale attached to this building. The mountain is chiefly composed of limestone; I also saw some granite.

Rás Ka'ú is a projecting cape, lying 17 miles E. by N. of the entrance of Khór 'Amrán, which, from its dark appearance, is commonly known by the name of the Black Cape: it is in lat. 12° 39′ 45″ N., long. 44° 32′ 30″ E. Three miles inland to the N.N.W. is the remarkable saddle-hill named Jebel Ka'ú, rising 798 feet above the sea; three other small hills occur to the south-west of it, near the coast. Between this cape and Khór 'Amrán a very dangerous sand-bank with overfalls extends, at one point reaching 4 miles off-shore: no vessel should approach nearer than to 15 fathoms water by day, and 20 fathoms by night, and even then great attention must be paid to the lead.

The whole of this coast is low and sandy with a few bushy

shrubs, while here and there a rocky point breaks the desolate monotony of the scene. To the eastward of Rás Ka'ú the coast is still flat and sandy for 18 miles, as far as Rás 'Amrán, forming a bay nearly 5 miles deep: the land towards the interior is low, and covered with ragged wild bushes. Antelopes, hares, plovers, partridges, bustards, and various small birds of beautiful plumage, were seen. At Rás 'Amrán the territory of the Ṣubeïḥí tribe of Arabs terminates: these people, though numerous, are little known: from the slight intercourse we had with them, I should consider them kind and communicative, and well adapted by figure and constitution to endure hardships. We had some difficulty at first in making acquaintance with them; but when they gained confidence, they accompanied two of the officers of the ship, Messrs. Ball and Grieve, to the summit of Jebel Jinn, when they found the ruins before alluded to, which may possibly be of the same date as those of Naḳab el Ḥajar,* Ḥiṣn Ghoráb, &c. The Ṣubeïḥí tribe are said to number 12,000 persons: they are Mohammedans, and are governed by their principal chiefs, who are absolute. The women are, generally speaking, delicately formed, with very dark eyes and long beautiful hair. Their territory is, for the most part, barren, yet on a few productive spots they cultivate coffee, fruits, &c. Cattle may be always found in large flocks, and camels in great numbers.

Rás 'Amrán, in lat. 12° 43′ 30″ N., long. 44° 49′ 40″ E., is the S.W. extreme of a small rocky island, divided from the mainland by narrow channels, almost wholly filled up with rocks: off its western side are three small rocks of considerable elevation, with deep water close outside them. The cape of the mainland is a rocky promontory, rising 712 feet above the sea, which projects, including the island, about 2½ miles in a S.S.W. direction from the general line of coast, and forms the western limit of the bay which lies to the eastward.

Bander Feïkam is a bay about 5 miles broad by 2 miles deep, formed by the projecting land of Rás 'Amrán on the W. and Jébel Ḥasan on the E.; near its centre is a small round island, with a rock, barely covered with water, about 800 yards to the E.S.E. of it, with from 5 to 6 fathoms water between it and the island, to the N.W. of which a shoal-patch extends a short distance. On the western shore of this bay is the tomb of Sheïkh Sammarah, surrounded by a few fishermen's huts. Projecting to the S.E. is a small dark-coloured peak called Jezírat Abú Shammah, and to the westward of it are two anchorages for small boats. The land surrounding the bay is a low, dreary, swampy tract of sand-hills, so much so, that at high water each cape appears like an island. The soundings in the bay are regular, and the bottom of sand or mud.

* Described in Journal, vol. vii. p. 20.—ED.

Jebel Ḥasan is a mountainous mass of granite, which forms a peninsular promontory, 6 miles long from E. to W., by 3 miles in breadth: its highest peak, in the form of a sugar-loaf, reaching 1237 feet above the sea. This promontory has numerous projecting rocky points, to each of which the Arabs give a name: to the S.W. are Rás Feïkam and Rás Alargah;* the most southern, called *Rás Mujallab Heïdí,* is in lat. 12° 43′ N., long. 44° 59′ E., and forms the western limit of the small bay named Bander Sheïkh. Rás Abú Ḳiyámah divides this bay from Khór Ḳádir. On the southern and eastern sides of this promontory are nine rocky islets, nearly connected with the main at low-water springs; two of these islets lie in the middle of the entrance to Khór Ḳádir; another is situated off the S.E. point called Rás Ṣáliḥ; and five of them off the N.E. bluff, about 1 mile from the shore.

The white tomb of Sheïkh Kádir is about 1100 yards to the northward of the extreme point of Rás Abú Kiyámah; near this spot the 'Aḳrabís deposit coffee, cotton, and a few other articles of merchandise, in readiness for the small trading-boats lying in Bander Sheïkh and Ghór Ḳádir, the only two ports belonging to the 'Aḳrabí tribe.

At the eastern end of this mountainous promontory is a remarkable double peak of granite 700 feet in height, which from its peculiar shape is commonly known by the name of the Ass's Ears. The outline of the whole of Jebel Ḥasan is very picturesque: a deep ravine winds through the hilly tract from Bander Feïkam to the little bay of Bander Sheïkh. The land to the northward is low, and immediately at the back of the mountains a deep inlet, named Khór Biyar Aḥmed, or Seïlán, extends 3 miles to the westward, almost insulating the promontory of Jebel Ḥasan.

Biyar Aḥmed, a small fort and village situated about 3 miles from the beach, and 6½ miles due N. of the Ass's Ears, contains about 250 inhabitants: it is the residence of the chief, or Sultan, as he is called, of the 'Aḳrabí. About 2 miles to the N.E. of Bíyar Aḥmed is the village of Seïlán.

The territory of the 'Aḳrabí tribe does not exceed 20 square miles, with a population of 600 males, a fine body of men, who keep their more quiet neighbours in a constant state of alarm. Their chief is named Aḥmed ibn Meïdí, who in person conducts his followers through every kind of war and rapine, and has for many years supported himself in independence, until forced to pay a tribute to a neighbouring chief in consideration of the freedom with which he is permitted to spoil the adjoining tribe of Abdálí. This chief is noted for his treachery, and it was not without some difficulty that we established any communication with him; but at length he al-

* From the Portuguese "alarga?"—F. S.

lowed two of the officers, Messrs. Cruttenden and Grieve, to visit his village, and received them very civilly. The women of this tribe are generally pretty, of a slight, elastic, healthful form, which, added to great cheerfulness, creates a charm not often awakened by the tawny inhabitants of a tropical and desert country. This territory is bounded on the N.E. by the Abdálí and Haushábí, and to the westward by the Subaïhí tribes. The chief produce of the soil is jowárí (millet), of which they export great quantities; large flocks of sheep and goats are seen browsing, tended by the watchful eye of the pretty Bedowín shepherdess: in the interior are thick forests of thorny acacia, affording a retreat to the antelope from the scorching rays of the sun; doves also are numerous, and occasionally may be heard the lively chirrup of the Bayah, or Hottentot crested sparrow, and the warbling of a small beautiful bright yellow bird with crimson legs. Indeed, notwithstanding the usually arid appearance of the country, much may be found here, as well as elsewhere, to enliven the traveller as he passes on, or to break the monotony of a minute nautical survey of a little-frequented coast.

Bander Tuwayyí, or 'Aden West Bay, (the 'Aden Back Bay of Horsburgh,) is formed by the projecting headlands of Jebel Ḥasan on the W. and Jebel Shamshán on the E., enclosing a bay 8 miles broad from E. to W., by 4 miles deep, with an entrance between Rás Salíl on the W. and Rás Társheïn on the E., exactly 3 miles 750 yards wide. The peninsular promontory of 'Aden is almost divided from the main land by a creek on the eastern side of this bay named Khór Maksá, similar to that behind Jebel Ḥasan on the opposite side of the bay, which gives these lofty promontories—not very unlike in appearance—the aspect of two sentinel islands guarding the approach to the magnificent bay they enclose. A ship may anchor in any part of this bay, the soundings gradually decreasing from 5 fathoms towards the shore, with a clear sandy bottom. In going into the inner or eastern bay it is requisite to keep over on the starboard or southern shore, as a flat runs off ½ a mile to the southward of the small islands of Alikah. Probably just past Flint Island or Sheïkh Aḥmed would be as good an anchorage as any: of course with a westerly wind the smoothest water will be on the west side. The tides in the bay are strong and irregular, owing to the influence of the outside currents: by several observations the rise of tide at full and change was 8½ feet between the hours of nine and ten. Variation of the compass 5° 2′ W. in 1836.

Jebel Shamshán, so called from the turreted peaks on its summit, is a high rocky promontory of limestone, the most elevated point of which reaches 1776 feet above the sea; it extends 5 miles from E. to W. by 3 miles in breadth, its southern point Rás

Sinaïlah, the Cape 'Aden of our charts, being in lat. 12° 45′ 10″ N., long. 45° 9′ E. Numerous rocky points project from this mass of mountains forming small bays and shelter for bagalás or boats.* Commencing on the inner or north-western side, the point of Hejáf forms the southern and western limit of the inner bay; immediately off it lies the rock of Jeramah, and 1 mile due N. of it are the two islands of Jám 'Alí and 'Alíyah; but, as before mentioned, a flat, dry at low-water spring-tides, runs out ½ a mile to the southward of these islands, thus narrowing the passage into the inner bay to ½ a mile, with 2½ fathoms water in the mid-channel. Within this bay are five small rocky islands: the eastern and principle one, named Jezírah Sawáyíh, is 300 feet high, and almost joined to the main-land at low-water spring-tides. The others are named Marzúk Kebír, Keïs el Hammán, Kalfeteïn, and Firinjí. Proceeding to the westward, nearly ½ a mile from Hejáf, is the rocky point of El 'Aïnah, and ¼ of a mile beyond the Flint rock or small island of Sheïkh Ahmed; 500 yards further W. is the small point of Rás ibn Tarsheïn; rather more than ½ a mile beyond is Rás Marbút, and the same distance again brings us to the extreme W. point of this promontory, named Rás Tarsheïn; the high peak about 1½ mile at the back of which reaches 988 feet above the sea. Turning thence to the S.E., the same bold coast continues for 2¼ miles as far as a round island named Jezírah Denáfah, 1 mile beyond which is Rás Sinaïlah, the southern point of this peninsula.

Rás Marshigh, 2 miles farther E., is a narrow projecting cape forming the south-eastern point of the promontory, and affording shelter to the anchorage called Bander Darás, lying between this latter cape and Rás Taïh.

'Aden, once a populous town, now a ruined village of 600 persons, is seen immediately on rounding Cape Marshigh, lying on a plain little more than ½ a mile square, encircled on the land-side by singularly-pointed hills, with its eastern face open to the sea, while immediately in front is the rocky fortified island of Sírah. The position of the N. point of this island, which may be taken as that of the town of 'Aden, is 12° 46′ 15″ N. lat., by means of numerous observations of sun and stars on shore; and 45° 10′ 20″ E. long., being the mean of eight chronometers measured from Bombay, the flag-staff there, as before mentioned, being assumed at 72° 54′ 26″ E. This island commands the eastern bay and town of 'Aden: it is a triangular rock about 430 feet high towards the

* Captain Haines's Memoir is accompanied by a beautiful plan of 'Aden and of the adjacent bays on the scale of one inch to a mile; with several spirited outline sketches of the high land forming Cape 'Amrán, Jebel Hasan, and Jebel Shamshán or Cape 'Aden, which give a much better idea than can any description of the numerous peaks and varied outline of these remarkable mountains.—Ed.

southern end, ½ a mile long by 600 yards broad. Of late years the sand has filled up the small creek which used to separate it from the main-land, consequently at low-water it is now joined to the coast of Arabia.

On the summit of the island is an old fort with a wall which reaches down to the round tower on the other side, the only fortification now perfect. But if these were all put in repair a mere handful of men could defend it: three reservoirs for water still remain, but one of them is almost entirely filled up with sand and stones.

Between the island and Rás Marshigh the curve of the land forms a small sandy bay named Bander Hokat, and another to the northward between the N. point of the island and Rás Kutam.

The anchorage in the eastern bay of 'Aden is very regular, so that a vessel may choose her own position, from 5 to 10 fathoms. During the easterly winds a heavy swell rolls in, but from June to August, with the wind from the westward, good anchorage and smooth water may be always found close under the island. The hot dry gusts blowing from over the hills are usually strong and disagreeable.

There are several mosques in 'Aden, but the only one kept in repair is that lying immediately to the southward of the town, being the mosque and tomb of Sheikh Idrís. To the S.W. the Wádí Kubbeh, or Tomb Valley, extends among the numerous pointed hills that enclose the plain: to the N.W. a track leads through a pass in the hills, at an elevation of 226 feet, and descends upon the shore of the western inner bay, and on the sandy isthmus which joins this rocky peninsula to the main-land. And here we are indebted to the perseverance of the late Dr. Hulton, our surgeon, and Mr. Cruttenden, of the *Palinurus*, for the discovery that what has hitherto been vulgarly termed a Roman road is in fact the aqueduct of Soleimán the Magnificent, extending in a general N.W. direction upwards of 8 miles into the interior. It is built of red brick and stone, about 4 feet 6 inches wide, and the enclosed water-course measures 19 inches by 16: there are no remains of arches, the ground not requiring them; and its general appearance is that of a mound about 5 feet high, and bricked over. Commencing at the northern extremity of the peninsula, just inside the ruined wall named Dureïb-el-'Arabí, which extends from sea to sea entirely across the isthmus, only 1300 yards wide at this part, the aqueduct for the first mile curves slightly to the eastward, whence it assumes a N.W. direction as far as the village of Biyar Amheït, a distance of 16,320 yards along the line of aqueduct. Here was the source that supplied the various reservoirs placed at certain distances along its side: the well is 60 feet deep, and near it are the ruins of a small

fort. The white tomb of Sheïkh 'Othmán is conspicuous on the right side of the aqueduct about 2½ miles before reaching Biyar Amheït; and a bridge on the line is thrown across the north-eastern end of the inlet of Khór Maksá, where it joins a large swamp. The labour and expense employed by the Turks to ensure a plentiful supply of water, one of the prime necessaries of life in this arid and burning clime, are highly praiseworthy. Besides the magnificent aqueduct above mentioned, there are numerous hanging tanks, if the term may be allowed, formed by excavations in the limestone rocks, which receive the mountain-stream and have a deep hollow beneath prepared to receive the surplus water overflowing from that above. There are also several tanks of great size around the town, and about 300 wells lie towards the plain, many of which are hewn out of the solid rock, from 60 to 125 feet deep. Another fine tank just beyond the before mentioned wall was exclusively intended for the use of vessels in the harbour. Such magnificence in works of public utility bears the strongest evidence to the former state of opulence and prosperity of 'Aden: indeed, we know that scarcely two centuries and a half ago this city ranked among the foremost of the commercial marts of the East. In the time of Constantine it was considered a Roman emporium, and celebrated for its impregnable fortifications, its extended commerce, and excellent ports, in which vessels from all the then known quarters of the globe might be met with. But now what a lamentable contrast! Its trade annihilated, its governor imbecile, its tanks in ruins, its water half brackish—deserted streets and still more deserted ports—yet these latter remain as nature made them, excellent, capacious, and secure.

The remains of several old fortifications and other buildings are met with along the rugged paths of Jebel Shamshán. In 1838, accompanied by Lieutenant Swan, Dr. Arbuckle, and Mr. Hamilton, officers of the *Palinurus*, I ascended this mountain, and discovered, to my surprise, that an excellent road had already been made from its base to its summit, built in a zig-zag direction, from 10 to 12 feet broad, and in some places raised to the height of 20 feet. Centuries have elapsed, probably, since this great and skilful undertaking was completed; yet it is extraordinary to observe how slightly it has suffered from the destructive effect of time.

Another object here of some interest to the historian is a Turkish cemetery on the S. side of the plain of 'Aden: many of the tombs are constructed of white marble, and the head-stones inlaid with jasper tablets, on which are inscriptions surmounted by the cap and turban. At 'Aden also are 3 long brass guns, probably relics of Soleïmán the Magnificent, perhaps brought here by his fleet in 1530. The longest measures 18½ feet,

and would probably carry a shot of 80 lbs.; the inscription on this could not be deciphered: the second measured 17 feet, and bore upon it "made by Mohammed ibn Hamzah," in the year of the Hijrah, 701 [?] The third is highly ornamented, and measures 15 feet 7 inches, and the only trace of inscription is "Soleïmán ibn Selím, 901" (A.D. 1523).*

The peninsula of 'Aden bears much resemblance to the rock of Gibraltar, and could easily be rendered as impregnable; but its rocky heights are more elevated and much more peaked in their outline than those of that celebrated European fortress.

The present sultán of the Abdálí territory, in which 'Aden is situated, is an indolent and almost imbecile man, 50 years of age, who resides at Lahaj. He is named Al Hasan ibn Fudhl 'Abdu-l-Karím, and has seven sons, the eldest aged 22. The Abdálí tribe is said to number 10,000; yet this chief permitted the Fudhlí in 1836 to ransack the town of 'Aden, and carry off 30,000 dollars (6000*l.*), and afterwards, in order to make peace, consented to pay a tribute of 365 dollars, 365 mansúríes,† and 40 camel-loads of jowárí (millet).

At 'Aden good water may be procured (but it requires care); fire-wood, vegetables, and fruit are scarce and dear; in August and September grapes and pomegranates may be had; bullocks and sheep are plentiful, and occasionally poultry.

Of its present population of 600 persons 250 are Jews, 50 Banians, and the rest Arabs: here is a dowlah, or assistant-governor, a collector of customs, and a guard of 50 Bedawí soldiers. The exports consist in coffee and jowárí in small quantities; the imports, of cotton cloths, iron, lead, rice, dates, and occasionally cattle and sheep from Berberah, Bander Kásim and Zeïla', which afford the Arabs an opportunity of improving their breed of cattle. The revenue is derived from a heavy duty on both exports and imports, and a land-tax of 25 per cent. (?), and amounts, I believe, to about 12,000 dollars (2500*l.*) annually; yet the dowlah contrives to increase this sum by his extortions on every occasion. The sultan possesses 3 small vessels.

But, as before mentioned, the superiority of 'Aden is in its excellent harbours, both to the E. and to the W.; and the importance of such a station, offering, as it does, a secure shelter for shipping, an almost impregnable fortress, and an easy access to the rich provinces of Hadramaut and Yemen, without the long voyage to Mokhá, is too evident to require to be insisted on.

Lahaj is a dirty, populous town, about 18 miles N.W. of 'Aden,

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* A drawing of these guns is given in Captain Haines's original MS.

† Mansúrí, a small copper coin, bearing the impress of Mansúr, one of the Imáms of San'á: 365 of these equal a German crown at Lahaj, and answer to the Komásí of Mokhá.

in lat. 13° 2′ N., long. 45° 0′ 30″ E., standing in a wide plain, surrounded by gardens and date-trees. This is the residence of the sultan of the Abdálí, and his palace, built of stone and mud, is situated on the W. side of the town, and guarded by a host of armed slaves. The population of the place may be 5000, among whom are a few Jews and Somálís. The bázár is filled with inferior silks, cotton cloths, dates, butter, tobacco, &c. A great portion of the land in the neighbourhood is cultivated, and produces some flowers and fruits, among which I observed the melon, lime, mango, almond, plantain, and jasmin, which last is very highly prized by the Bedowin girls, who link it into wreaths to adorn their raven tresses. On the road from 'Aden to Lahaj the traveller passes through several scattered villages, thinly peopled; Darab, Mahallah, and Misderah, are mere collections of rude huts made of mats, each village having a tower for its protection in the centre. The spoils of a shipwreck which had recently occurred bedecked the persons of their wretched inhabitants.

The Abdálí appear to be strict Mohammedans.

Quitting Cape 'Aden, which is perhaps the most remarkable feature on the S. coast of Arabia, the land turns suddenly to the N.N.E. for 19 miles, then again to the eastward for 12 miles, reaching to Rás Seïlán, a low, round cape. The shores around this bay, which is called Ghubbet Seïlán, are flat and sandy, gradually improving as you advance to the eastward. A low plain extends into the interior covered with stunted bushes and patches of the cotton-tree and acacia, which latter thrives luxuriantly in this arid soil. The soundings in this bay are irregular: the shoal water extends to a considerable distance off-shore, and vessels should, if possible, avoid it, owing to the difficulty they might experience in getting out of the bay when blowing hard from the eastward. A ship was wrecked here in 1836, and two bagalás narrowly escaped sharing the same fate.

This part of the coast is inhabited by the Yáfa'í, a numerous tribe, said to amount to 20,000 persons, spread over an extensive tract of country, and reaching inland to the high mountains called from them the Jebel Yáfa'í: this range, which rises about 6500 feet above the sea, extends in an E. and W. direction, generally speaking, about 30 miles from the shore, but the bight of the bay of Ghubbet Seïlán approaches it within 20 miles. The Yáfa'i territory on the coast lies between the Abdálí to the S. W., and the Fudhlí to the N.E.: in the interior it is mountainous, with numerous fertile valleys, producing coffee, wheat, and millet* in abundance. It formerly extended for 40 miles beyond Rás Seïlán; but during

* Jowárí of the Hindús, dhurrah of the Arabs; *i. e.* sorghum vulgare, or saccharatum.—F. S.

the years 1837-8 the Fudhlí have been too powerful for them, and have obtained possession of this fertile tract of country, which has long been a cause of altercation between them and the Yáfa'í on account of the abundant produce of the cotton-trees: the last victory gained by the Fudhlí was in 1837, when they took possession of three towers erected a short distance from the coast, for the protection of this fertile tract, expelled the Yáfa'ís, and are still, I believe, the unquiet possessors of it, being constantly subject to the invasions of their rivals; 500 Bedawís are always kept in readiness to repel an attack.

Ghább Wálí, a village about 5 miles N.W. of Rás Seïlán, is situated near the above-named towers; and during my visit to it preparations were in progress, on the part of the Yáfa'í, for the renewal of hostilities against the Fudhlí, as a year's truce which they had made would expire on the 18th January, 1838. Seven hundred matchlocks were already collected, and the cotton gathered in and forwarded to the interior, to be conveyed to Hadramaut for sale, as the Yáfa'í have no vessels.

Sultán 'Alí ben Ghálеb, chief of the Yáfa'í tribe, is a bold and resolute Bedawí, with a daring, yet handsome expression of countenance. His family consists of several sons and daughters; the eldest girl is married to the chief of the Fudhlí, but this does not prevent their constant feuds, notwithstanding which, presents are constantly exchanged between father and daughter.

The principal residence of the sultan is at El Gharrah, a town about 100 miles, or 5 days' journey, from Sughrá. From the little intercourse we had with the Yáfa'ís they seemed to partake much of the character of their chief. They possess large flocks of goats and sheep, numerous camels, and a few horses.

Rás Seïlán is a low, round, sandy point, in lat. 13° 3′ 30″ N., long. 45° 28′ 30″ E.: a few date-trees grow near the cape, with some larger trees to the N.W. About 1½ mile to the westward of the cape is the village of Sheïkh Abdallah ben Marbút, containing one square building and a few huts: it forms the present limit of territory between the Yáfa'í and the Fudhlí. From Rás Seïlán the coast runs in an almost straight N.N.E. line for 20 miles to Sughrá, with a sandy beach the whole way. The bank of soundings off Rás Seïlán extends 10 miles off-shore, dropping suddenly from 40 to 100 fathoms at that distance: the 20-fathom line of soundings averages a distance of 5 miles from the coast. Sand, shells, and broken coral is the usual nature of the bottom along this portion of the shore.

Al-sálih is a small town 10 miles to the N.E. of Rás Seïlán, and about 2 miles from the coast. It contains 200 houses, 40 of which are built of stone—its population about 500; the country immediately around is well watered and cultivated. The trade of

this place is in the hands of a few Banyans, among whom is the sultan's agent. We were received here with civility, and good faith was evinced in their transactions with us. A few partridges were shot. To the S.E. of Al-sálih the tomb of a sheïkh lies near the beach, and close to it the fishermen draw up their boats. About 6½ miles to the westward, towards the interior, is a village named El Khór, surrounded by low hills, on which small towers have been erected for the purpose of its protection: its inhabitants are chiefly agriculturists, and the soil amply repays the trouble bestowed on it. Here, and at Al-salih, the nephew of the sultan governs as a lesser sheïkh.

Barrow Rocks, so named from the discoverer, are two dangerous rocky reefs, with only 6 feet water on one: they lie 1¼ mile apart, and 2 miles distance from the coast, rather more than half-way between Al-sálih and Sughrá, from which latter place the northern reef bears S.W. 4½ miles distant. The best direction for clearing them is to keep in 15 fathoms water, while the dark saddle-shaped hill called *Kermin Kálási* bears on any point between N.N.E. northerly to N.N.W. This hill, which is about 1½ mile from the beach, bears N. by W. 3 miles from the northern reef. There is a channel between the reefs and the shore 1½ mile wide, with 6 fathoms water.

Sughrá,* the principal port of the Fudhlí district, is a village of 200 persons, with a stone building called a castle, being the residence of the sultan for several months of the year. This castle lies in 13° 21′ 30″ N., 45° 46′ E., and is situated about a quarter of a mile from the beach, on the borders of a plain commencing at the foot of Jebel Kharaz, which is its eastern limit; having the valley leading to Wádí Bahreïn, and a barn-shaped hill with a peak on its western end, to the north; and a number of granite hills, terminating in a small eminence, forming a point to the westward at some distance from the sea, probably the Black Point of Horsburgh.†

Much millet is cultivated, and here is also a large grove of date-trees in the immediate vicinity of the village.

A break in the reef of rocks, which girts this part of the coast at a distance of ½ a mile, forms a small harbour or shelter for bagalás, with 1, 2, and 3 fathoms water. The *Palinurus* anchored in 9 fathoms water, muddy bottom, 600 yards from the edge of the reef, the sheïkh's castle bearing N. by W.; high-water on full and change at 7 o'clock; rise of tide from 8 to 9 feet; the flood-tide sets to the westward, variation 5° west in

* By corruption often pronounced and written Shugra.

† Vol. i. p. 259.

1837.* Good water, bullocks (similar to those of Súrat, and at a moderate price), sheep, poultry, onions, and pumpkins may be easily procured. The *Palinurus* was probably the first European vessel ever anchored on this part of the coast, and it was amusing to see the general curiosity excited, particularly when the guns were fired; the exclamations of surprise knew no bounds. Our reception, after the first shyness had been overcome, was very cordial. The sultán, as he is called, is named 'Abdallah ben Ahmed ben Fudhlí, and in 1837 his family consisted of three sons and three daughters, whose mother is the daughter of the Yáfa'í chief before mentioned. 'Abdallah is far from prepossessing in appearance, of slight proportions, but resolute and determined in character, and much respected and feared by his neighbours: the Fudhlí tribe is reckoned at 15,000 persons, 4000 of whom are said to be capable of bearing fire-arms. The territory is stated as extending northerly to the distance of 80 miles, bounded on the E. by Makátein and the Urlají tribe, and reaching as far as Rás Seïlán on the W., comprising about 70 miles of coast. The country is chiefly mountains, Jebel Kharaz, a high range 16 miles N.E. of Sughrá, reaching 5442 feet above the sea. The Wádí Bahreïn winds through this range of mountains, abundantly supplied with streams which flow into an extensive lake, whence the valley takes its name. The largest village in this district is Meïn, with a population of 1500, said to lie 36 hours' journey to the N.W. of Sughrá. Many of the natives are said to inhabit caves in the mountains. The Fudhlís are a fine, bold-looking race of men: the women are the prettiest we have seen in all the parts of Arabia we have visited. Their religion is a lax state of Mohammedanism; the fast of the Ramazán almost passes unnoticed. The import and export duties are valued at 600 dollars annually. At the time of our visit, a dollar, or 4*s.*, would buy 12 lbs. of coffee, 150 lbs. of millet, or 24 lbs. of g'hí or clarified butter.

From Sughrá eastward to Makáteïn, a distance of about 44 miles, the coast becomes irregular. For the first 13 miles it is flat, and then gradually ascends from the sea to the heights of Jebel Kharaz; advancing to the eastward we suddenly lose the bank of soundings which extends from 'Aden rather beyond Sughrá, and find from 20 to 30 fathoms close in-shore.

Jebel Kharazi, or Fudhlí, is a range of lofty mountains extending for about 20 miles nearly E. and W., about 5 miles inland

* A plan of the anchorage at Sughrá, including Barrow's Rocks, on the scale of 1 inch to a nautic mile, accompanies Captain Haines's excellent chart of this coast.—Ed.

from the coast, which follows the same direction. Its summit is singularly broken into gables, peaks, and bluff points. The most conspicuous gable is rather to the W. of the centre of the range, and rises 3900 feet, and is remarkable for an opening like a great embrasure, or cleft, which gives it, from the eastward, the appearance of a double peak, whence it descends almost abruptly towards the sea. The highest point of the range is to the westward, and reaches 5442 feet: from this it declines slightly to the eastward, when a barn-shaped mountain reaches 3950 feet above the level of the sea. The structure of this range is, I believe, limestone, but we were not able to land to examine it: the valleys appear well wooded.

Makátéin* is an anchorage formed by a slightly projecting rocky point of the coast, resorted to by trading vessels for shelter during the N.E. monsoon: the cape lies in 13° 24′ 30″ N., 46° 32′ E., whence some rocky islets project to the southward about 500 yards, and a reef to the distance of 1¼ mile.†

Makáteïn may easily be known by two black hills immediately to the eastward, and close on the sea. There are others 3 or 4 miles farther E., but not so distinctly separate as the former; when arriving from the eastward, they resemble one long hill; 500 yards to the N. of the point of the cape is a black ruin. High-water here on full and change at 9 h.; rise of tide 6 feet; variation 5° 12′ W., in 1835. Five miles W. of this spot is the best anchorage off Makáteïn-Seghír, or the lesser, formed by a projecting point. Six miles to the eastward of Makáteïn is the small rocky point named Sambeh, and for 13 miles beyond, as far as Howaïyah, a low sandy coast with rocky points prevails: throughout this distance the bank of soundings extends about 6 miles off-shore.

Howaïyah is a town of about 600 houses, situated on a wide plain, 5 miles inland, bounded on the N. by hills, the principal house in lat. 13° 28′ 45″ N., long. 46° 47′ 25″ E. This is the residence of Násir ben Abú Bekr, chief of the Urlají tribe, who received us civilly, and supplied the officers who visited him with horses to ride through the adjoining hamlets, the population of which, including the town, may amount to 5000 persons, chiefly employed in agriculture. We here got some fine bullocks, with an abundant supply of good water and excellent fish.

Nasál, a town of the Urlají tribe, seven days' journey, or about 200 miles, from Haur, is said to be populous, and the soil to be fertile. *Maghná* is another small town situated in a secluded spot 4 miles farther inland.

* Commonly written and pronounced Mughatain, k being sounded like g.

† A plan of Makáteïn, on the scale of 1 inch to a nautic mile, accompanies Captain Haines's chart of this coast.—Ed.

The Urlají territory extends about 55 miles along the coast from Makátein on the W., to Wádí Sanam on the E., and is said to reach 200 miles into the interior. The coast is flat, but about 35 miles inland is a high mountainous range of very irregular outline. We are told that the tribe can muster from 7000 to 8000 fighting men.

Rás Urlajah is a low sandy cape: the soundings off this part of the coast, and for some distance to the eastward, are regular, the 20-fathoms bank reaching about 2 miles off-shore, with sand and coral, and 160 fathoms at 6 miles' distance. Twenty-one miles farther E. is the tomb or kubbeh of the Sheïkhah Hurbah, a female devotee, who is said to have perished from voluntary starvation, imagining that it would be a meritorious act in the sight of her Maker and of Mohammed, as she believed, his prophet. This ancient shrine is very conspicuous, being covered with white chunam.*

Twenty miles to the eastward is the mosque of Sheïkh 'Abdu-r-rahmán Baddás, standing on a low, round, sandy point, and a village inhabited by a few fishermen. Two banks, with 40 fathoms water, are reported to lie at some distance off-shore at this part of the coast, but we were not successful in our search after them.

Rás Safwán is a slightly projecting point thinly covered with bushes, on its extreme edge, in lat. 13° 48′ N., long. 47° 42′ E.; almost immediately N. of it is the southern peak of the *Jebel Hamarí*, which range forms the leading feature on this part of the coast: it extends from 25 to 30 miles in a N.E. direction, its highest central peak, about 16 miles N. ½ W. of Rás Safwan, rising 5284 feet above the sea. This range is apparently of limestone, and, when seen either from the eastward or westward, its summit resembles the roof of a barn. The aspect of the whole range is very dismal and rugged. The peak lies in 13° 3′ 30″ N., long. 47° 37′ 30″ E. A little more than 1 mile N.E. of the cape is the village of Haurá, of about 100 persons: it is only noted as the residence of a patriarch of the Dujábí tribe.

Jebel Makánáti is a projecting bluff on the coast, 4 miles N.E. of Haurá, forming a small bay for boats to anchor in: the cape is moderately elevated, perhaps 200 feet, and white with dark veins. Close off it lies a small island, and inland it terminates in sand-hills; from the summit of the cape several villages may be distinguished in the valleys of this territory; the extensive valley of Wádí Meïfah lies at the eastern foot of the Hamarí range;

* Chunam is the Hindú word chúná (from the Sanskrit chúrna) with the Portuguese nasal termination *m*. It signifies lime, particularly shell-lime, and thence a white plaster made of it, which takes a fine polish.—F. S.

fine large groves of date-trees add much to the beauty of the scene.

It is to the northward of this range, and apparently in a prolongation of the Wádí Meïfah, that the remarkable ruin named Naḳab el Ḥajar is situated, which was visited by two of the officers of the *Palinurus*, Lieut. Wellsted and Mr. Cruttenden, in April, 1835: unfortunately, Dr. Hulton, who volunteered his services to be one of the party, could not then be spared from the duties of the ship.*

Rás al Koṣaïr, a low rounded sandy cape, 7 miles farther to the N.E., has two large trees on the edge of the shore; a conspicuous gable-shaped hill rises in the distant range of mountains, with a bluff both to the E. and to the W. of it; the centre of the gable, or barn, bears from this cape N. by W. about 40 miles distant [?]. This is the eastern boundary of the Diyabí territory, which extends about 36 miles along the coast. They are a tribe much feared, and who bear a bad character. From this point as far as Rás el 'Aṣídah, a distance of 22 miles, the coast forms a bay 6 miles deep, named *Ghubbet 'Aïn;* on its shores are situated the villages of 'Aïn Abú Ma'bad and 'Aïn Jowárí; the former consists of a mosque and about 100 huts, the latter, of 70 huts; springs of water, (as their names denote,) date-trees, and jowárí, (sorghum or dhurrah,) abound. Farther to the eastward is the fishing hamlet of Gillah, inhabited by 50 abject-looking Baddás Sheïkhs, who are permitted to live unmolested, owing to the sanctity of their descent.

Rás el 'Aṣídah,† the eastern cape of this bay, is very conspicuous, from having at its extremity a dark, rocky, conical hill, 160 feet high, and not unlike a haycock: it lies in lat. 13° 57'. N., long. 48° 15' 20" E.‡ This cape forms three projecting rocky points; in a small bay to the westward is the tower of Bá-'l-háf, so named from a sheïkh whose burial-place is contiguous. The bay affords fair shelter during an easterly wind; but a good look-out must be kept in the event of its changing to the westward: the bottom is clean and the soundings regular. It is high-water on full and change at 8 h. 30 m.; the rise of tide from 5 to 6 feet; the variation 5° 23' W. in 1835.§ The tower is garrisoned by two or three Wáḥidí soldiers, who levy dues on

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* Captain Haines' memoir is accompanied by a sketch of these ruins by Mr. Cruttenden, with a ground plan, and a copy of the inscriptions: the latter differs in five of the characters from the copy published in the London Geographical Journal, vol. vii. p. 32.—Ed.

† Cape Porridge.—F. S.

‡ "Not," observes Captain Haines, "in 46° ¾ E., as published in the London Geographical Journal, vol. vii. p. 20."—Ed.

§ A plan of Rás el 'Aṣídah, and of Bá-'l-ḥáf, on the scale of 1 inch to a mile, is annexed to Captain Haines's chart.—Ed.

the goods landed here for 'Aden, Makallah, &c. Here is no fresh water but what is brought from a distance.

To the eastward of Rás el 'Asídah the coast takes an E. by N. direction for 30 miles, as far as Rás el Kelb; for the first half of the distance the shore is irregular, with rocky projecting points. Rás Rotl is a remarkable round cape, considerably elevated, perhaps 400 feet, with a deep hollow, apparently like a crater, in the middle; on each side of the cape is a bay for boats.

Jebel Hisn Ghoráb, 5 miles farther E., is a square-shaped dreary-looking brown hill, 464 feet in height, with steep sides, its eastern point lying in 13° 59′ 20 N., 48° 24′ 30″ E. It was here that the late Dr. Hulton and Mr. J. Smith, officers of the *Palinurus*, discovered, in the course of their indefatigable and successful rambles, that a narrow pathway led to the summit, and, as no difficulty ever deterred them from attempting an object attended with any prospect of success, they forthwith climbed up, and found the remains, which may be compared to those of Nakab el Hajar. Much time and labour must have been employed in the construction of the road, which in some parts is nearly 10 feet broad. On a second visit, these officers effected a more minute examination, measuring with care, and making plans of each separate portion. It was here that the inscription, in characters similar to those above mentioned, was found, carved on the smooth face of the solid rock, and whence it was copied by Dr. Hulton.* He described the inscription as being very slightly impaired by the lapse of years, and not one character seemed effaced. The tanks, together with the ruins of several walls, were composed of cement as hard as the rock itself. I am indebted to Lieutenant Sanders, who afterwards became my assistant-surveyor, for a plan of these remarkable remains. I will not attempt to draw any conclusion as to the period in which a city may have flourished here, nor venture an opinion concerning the supposed unknown character of the writing, as a copy has already been sent to those more competent to come to a correct decision on this point;† but I may briefly mention that an Arab tradition states that this spot was originally peopled by a tribe called Kúm-Harmás, whose descendants still dwell near Makallah, and also by the tribe of Wádí Misenát (to the westward of Sihút); the former constitute a separate and distinct tribe, now bearing the name of Bení Seïbán, who have insensibly become incorporated, and many of them will be found dispersed among other nations.

* See Bengal Asiatic Journal, for 1834.

† A copy of this inscription, as well as of similar inscriptions found at Nakab el Hajar and at Ṣan'á, has been forwarded to Professor Gesenius at Halle. See also several letters on the subject of the Ikhkilí or Himyaritic language, by M. F. Fresnel, at Jiddah, in the 'Journal Asiatique,' for July and Dec. 1838.—ED.

The Wádí Misenát tribe still maintain a desolate and exclusive mode of living, and are known by the opprobrious epithet of 'Abíd el 'Ibád,* or the slaves of Somálís. This appellation arose from their assimilation with the slaves of Africa. On the N.E. side of the continent of Africa, there is a district called Samhá, containing the populous towns of Makdishá and Jubah, bordering the river of that name, known by the natives of Bráwah as Wewendah.† This river rises, it is said, in Abyssinia, probably in the Mountains of the Moon. The language of the people inhabiting these towns is wholly unlike the Sawáhilí‡ spoken in Zingíbár; and it will be remembered that, when the Portuguese took possession of this coast in the 15th century, they found the villages, &c., from Makdishá to Sofálah, governed by Mohammedans, differing in dialect, person, and character, from either the Arabs or Africans. The causes which have led to so great a dissimilarity in people who occupy almost the same spot of land I leave to those more versed in such inquiries: one thing, however, appears certain, that there was an established facility of intercourse with Abyssinia; and since the tide of population from that part of the world flowed down the Jubah, and there exists an affinity between the languages, the presumptive intimacy of the two nations acquires double weight. Possibly a clue might thus be traced to elucidate the name and origin of the tribe who are said to have occupied this station, and then proceed towards solving those hitherto undeciphered inscriptions. At whatever time the buildings around Hisn Ghoráb were erected, I consider their discovery of great importance; the fort having, doubtless, been intended to protect the harbour on its eastern side, independently of the town beneath, which, judging from the size and extent of the ruins, must have been considerable. Its position would point it out as a sea-port of some consequence, and the citadel on the hill might be the grand dépôt for its commercial resources.

Bander Hisn Ghoráb, a small, secure, and well-sheltered bay and harbour 1¼ mile wide by 1 mile deep, lies immediately to the eastward of the black hill of Hisn Ghoráb. Off the eastern side of the bay a rock reef reduces the entrance to 1700 yards, or half its width, and must be carefully avoided. At the bottom of the bay is the square tower and hamlet of Bír 'Alí, or the Well of 'Alí, and several adjoining hamlets, containing each about 50 Wáhidís. In standing into the bay the square tower must not be brought to the northward of N. by E. ½ E. (magnetic.)

Haláni island, a rocky limestone plain, ¾ of a mile long from N.

* Literally slaves of slaves.—F. S.

† The plural of Wendah in the Sawáhilí language.—F. S.

‡ Sawáhil, plural of Sáhil, signifies "coasts;" the "coasters," or inhabitants of the shore, are therefore called sawáhilí, often spelt *sowyly* by travellers.—F. S.

to S. by ½ a mile broad, lies about 1 mile S.S.W. of Hisn Ghoráb Point, separated by a shoal channel: between it and Rás Mafrádáh, 2 miles to the westward, is a tolerable shelter against easterly winds.

Sha'rán is a circular table-topped sandstone hill 300 feet high, lying 3½ miles E. by N. of the point of Hisn Ghoráb, and close to the sea, remarkable for a cavity or crater-shaped hollow within, filled with water, the edge of which is fringed by an overhanging bank of mangrove-trees; the diameter of the cavity is about 2500 yards, and is reported by the Arabs to be fathomless. We had no means of ascertaining its depth in the centre, but at 8 yards from its western bank it was already 11 fathoms deep. The water is very salt, and on analysing it I found it to contain sulphuretted hydrogen.* This sheet of water is named Kharíf Sha'rán, and, having heard strange reports of it, I determined to visit it. Accompanied by Lieut. Sanders and Dr. Hulton, I landed early one morning, and, in spite of the superstitious feelings of the Arabs, but almost suffocated with heat, we scrambled up to the summit of the sharp circular edge that forms the bowl, whence we had a romantic and beautiful view: before us that deep dark water of Kharíf Sha'rán, girt by a belt of mangroves; immediately around rocky heights, frowning over fertile valleys which bloomed beneath; and in the distance the dark blue and ever-beautiful ocean, reaching away to the distant horizon, only broken by a few rocky islets, and perchance a solitary sail spread to catch the first breath of the ever-welcome sea-breeze. As before mentioned, this hollow resembles a crater, but I do not conceive it to be of volcanic origin. Our guides pointed out a level plain to the N. called Maïdán,† and said that a number of iron rings and pegs, commonly used to picquet horses, had been found there; but we could see nothing. We returned on board by noon, well pleased with our trip, but suffering much from the heat, which was oppressive in the extreme.

The Kadhreïn islands, or rather rocks, lie about 1 mile off-shore, nearly S.S.E. of Rás Khadá, a rocky point at the foot of the hill of Sha'rán.

Sikkah, or *Jibús*, is another small island, rising 450 feet above the sea, and lying 5 miles due S. of Rás Khadá, in lat. 13° 54′ 40″, long. 48° 28′ 20″ E., and may be seen at a distance of 30 miles: its summit is flat and white, owing to the excrements of numerous flocks of birds which resort thither, and keep up an abundant supply of this manure, so valuable to the agriculturists. This island is called Sikkah by the natives of the coast, and Jibús by Arab navigators, from its outline resembling the Kítár,‡ a musical instrument of the Indians.

* A sketch of this singular cavity accompanies Captain Haines's memoir.
† 'A plain.'—F. S. ‡ Either the parent or offspring of our word guitar.—F. S.

Rás Makdahah is a dark, moderately elevated cape, being the southern termination of a range of hills which extend 10 miles inland in a northerly direction: it forms the eastern limit of the Bay of Makdahah, affording an anchorage sheltered from easterly winds; the only danger is a sunken rock ½ a mile off-shore on the N.W. side. The village of Makdahah, consisting of a mosque, one stone and mud building, a few huts of matting, and a population of 60 persons, lies in the eastern angle of the bay, close under the hills. It affords no supplies, and indifferent water; yet, notwithstanding its poverty, it is the chief residence of the sultan or chief, Mohammed ibn Abú Bekr, a tributary of 'Abdu-l-Wáhid, who derives the principal part of his revenue from traffic in the aforesaid manure. He is a fine-looking man, and visited me on board the *Palinurus*, where he behaved very courteously.

Baraghah Island is a lofty and precipitous limestone rock without a vestige of vegetation, which lies off Rás Makdahah, between which is a safe channel about 1 mile wide, with 15 fathoms water. It lies in lat. 13° 58′ N., long. 48° 32′ 40″ E.

*Khárijah** is a town said to contain 3000 inhabitants, about two days' journey inland from Makdahah, between the first and second range of the Wáhidí mountains. It is in a fertile country abounding in date-groves and excellent pasture-land, affording food for numerous herds of cattle, which enables the natives to export large quantities of g'hí, &c.

Rás el Kelb (Cape Dog) is a low, round, sandy cape in lat. 14° 1′ 40″ N., long. 48° 46′ 50″ E., lying 13 miles E.N.E. of Rás Makdahah, the intervening coast being also low and sandy. This cape is considered dangerous, many boats and bagalás having been wrecked upon it, and thence it is said to derive its name. But if the lead be attended to, the soundings will give due warning of any danger.

From Rás el Kelb the shore turns abruptly in a N.E. direction for 40 miles as far as Makallah: the first part of it is wretchedly waste and sombre in aspect; sand-hills extend inland for some miles. The distant mountains in the interior appear equally sombre, yet relieved by a very irregular outline, assuming the form of peaks, bluffs, &c., and rising almost precipitously to the height of from 2000 to 4000 feet above the sea.

Rás Rehmat, the next cape, is elevated perhaps 300 feet, of limestone, and of a dark peaked outline; on its south-western face the sand from the plain has been swept up into a great heap by the strong S.W. monsoon: it takes its name from the effects experienced by the bagalás in running up during the tadhbíreh, the Arabs considering that, if they rounded this point in the S.W. mon-

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* El Khárijah, "the exterior," as the principal town in the Oasis of Thebes, is called El Khárijah, vulgo *El Chargé*.—F. S.

soon, the extreme violence of the wind had abated: it signifies "lull of the wind," a term frequently used by the Arabs when it falls calm. From seaward this cape is remarkable as being the commencement of the bold, rocky land extending from hence to the N.E. for 17 miles. Here is the eastern limit of the Wáhidí territory, which has a coast-line of 60 miles in extent; its only two ports are Bá-'l-háf and Hisn Ghoráb. The Wáhidí tribe consists of several thousand persons, and, it is said, can muster 2000 matchlocks in case of war. They are a brave, hospitable race, much respected and feared by their neighbours. The sultan Abdu-l-Wáhidí is said to be an upright chief, and possesses great influence on account of his noble descent. 'Abbán is his usual residence, and that town and Meïfah are said to be equal to Makallah in size and in the number of their inhabitants,

Rás Assasah, or Asr el Hamrá (Red footstep), is a rocky point, being the termination to sea-ward of a rugged range of hills which extend some distance inland: this cape is 6 miles N.E. of Rehmat, and in the valley between lies the town of Al Ghaïdhar, embosomed in luxuriant date-groves, at about 4 miles from the shore.

Rás Burúm, 8 miles farther, is a bold, dark, craggy cape, chiefly of limestone, the highest point of which I have seen at 38 miles' distance; the cape lies in 14° 18′ 30″ N., 49° 3′ 25″ E. Between this point and Rás el Ahmar, or the red cape, the coast forms a small bay called *Ghubbet Kulún,* and again to the S.W. another small bay, in the bight of which was a hamlet of about 40 miserable-looking people of the Berishí tribe.

The village or town of Burúm lies at the N.W. angle of a small bay* which forms to the N. of Rás Burúm: it is surrounded by date-trees, and situated immediately at the foot of an offset of the range of hills which here extends down to the shore and forms a bold and rocky coast. In 1835 its population was about 450, the huts and houses wretchedly built; but we obtained good supplies of water, wood, and stock. The natives were very civil to us. This village, as well as Fuwah, Al Ghaïdhar, &c., is under the Sheïkh Mohammed Safalí, chief of the Berishí tribe; he has also several smaller tribes tributary to him. Ijlí, a white mosque erected on an eminence a short distance from the beach, may be plainly seen by vessels passing along-shore; it was erected by a pious priest of the name of Sheïkh Wúlí, who is also patron saint of the village. The valleys inland hereabout are rich and beautiful, producing large quantities of millet; they are bounded by the purple-streaked mountains which rise from 5000 to 6000 feet above them, whose summits in the cold season, we were told,

* A plan of Bander Burúm, on the scale of 2 inches to a mile, accompanies Capt. Haines's Memoir.

are at times covered with snow. Heavy and continuous rains fall in November and December, July and August; and even in April and May I have seen rain for three days following. The variation here in 1834 was 4° 44′ W.

From the bluff of Radham, the N. cape of Bander Burúm, to Makallah, a distance of 15 miles, the coast is low and sandy, forming a slight bay, with high mountains in the distant background. About half-way from Burúm is the town of Fuwah, containing about 500 inhabitants, who were not very courteous to those of our party who visited them. The soundings throughout this extent are regular.

Rás Makallah is a low neck of land projecting about 2 miles in a S.S.E. direction from the base of the hills, which here extend from the interior close down to the shore; its S. point is in lat. 14° 29′ 40″ N., long. 49° 14′ 20″ E., with a rocky shoal with only 4 fathoms on it, lying ½ a mile to the S. Three-quarters of a mile W.N.W. of the cape is Rás Marbát, with a ruined fort; and 2 miles to the N.W., and within the bay, lies the town of *Makallah,* the principal commercial depôt of the S. coast of Arabia, partly built on a narrow rocky point, projecting about ¼ of a mile to the S., and partly at the foot of a range of reddish limestone cliffs, rising about 300 feet, immediately at the back of the town, and on which are 6 square towers for the protection of the place. Almost directly above this remarkably level range of cliffs the flat-topped summit of Jebel Gharrah, composed of beautiful white limestone, rises 1300 feet above the sea, and may be seen at a distance of 42 miles. The northern portion of the town is built on ground sloping from the base of the hills to the bay, and enclosed on the W. side by a dilapidated wall extending to the shore, with only one entrance-gate, constantly guarded by a few Bedowins. The Nakíb or Governor's house, a large square building, is in lat. 14° 30′ 40″ N., long. 49° 11′ 48″ E.; the other buildings are chiefly cajan huts. intermingled with a few stone houses and two mosques. The population of the town may be about 4500, being a motley collection of the Bení Hasan and Yáfa'í tribes, Karáchíes, and Banians, with foreigners from nearly every part of the globe. On either side of the projecting point on which the town is built is a small bay; that on the W. side is sheltered from the W. by a rocky reef, nearly dry at low-water spring-tides, and forms a haven much frequented by Arab boats and coasting vessels. I have observed 20 of these arrive in the course of a day, and some from 100 to 300 tons burden. The custom-duties are 5 per cent. on goods from India. The exports consist in gums, hides, large quantities of senna, and a small quantity of coffee; the

imports, chiefly of cotton cloths, lead, iron, crockery, and rice, from Bombay; dates and dried fruit from Maskat; jowárí,* bájerí,† and honey, from 'Aden; coffee from Mokhá; sheep, honey, aloes, frankincense, and slaves, from Berberah, Bander Kosaïr, and other African ports. Much coasting trade is also carried on. Traffic in slaves exists to a frightful extent; I have seen 700 Nubian girls exposed at once in the slave-market here for sale, and subject to the brutal and disgusting inspection of the purchasers; the price varies from 7*l.* to 25*l.* a-head. The duties here in 1834 amounted to about 800*l.*, but in 1836 to upwards of 1200*l.*; the chief part of the trade is carried on by the Banian merchants. The present Nakíb or chief, Mohammed ben 'Abdu-l-'Abíd, is a young man of firm and upright character, and is much respected: commerce has greatly revived since his reign. A ship in want of supplies will find Makallah the best port on the coast for procuring them: the water is good, but it requires watchfulness here as well as elsewhere on this coast to obtain it pure; there is none in the town; it is brought from a distance of 1½ mile, and furnishes a means of subsistence for many of the poorer class.

The anchorage in the bay is good, from 8 to 10 fathoms, sandy bottom, with the flag-staff on the governor's house bearing N.N.E. from ¼ to ½ a mile off-shore. A rock with only 1½ fathom water lies 700 yards due W. of the extreme S.W. point of the town, and must be carefully avoided. High-water at full and change at 8 h. 30 m., rise of tide 7 feet. Variation 4° 30′, W. in 1834.‡

While we were at Makallah an excellent opportunity for exploring the interior of the province of Hadramaút occurred, but on account of the expense it would have entailed I was obliged to decline it. The journey was to have been made in company with a respectable and wealthy merchant named Sálih ben 'Abdallah ben Sáïl, who, having been wounded in the arm by a musket-ball, had come to the coast in hopes of meeting with some European surgeon who could extract it for him: this was kindly and immediately done for him by Dr. Hughes, then a passenger on board the E. I. C. ship the *Hugh Lindsay*, and, in gratitude for the relief from violent pain, this merchant offered to conduct any officer safely to the interior on his return home; but, as before stated, we were obliged most unwillingly to decline it.§ Sálih

* Millet, or sorghum, of various kinds.—F. S.

† Or bájará,—Panicum spicatum.—F. S.

‡ A plan of the bay and port of Makallah, on a large scale, with a spirited outline sketch of the town and the Jebel Gharrah, is annexed to Captain Haines's memoir.

§ Should another opportunity offer, it is to be hoped that such a consideration will not be allowed to stand in the way. If a really competent traveller will undertake to explore the interior of Arabia, there would be no difficulty in raising the necessary sum to repay his expenses within reasonable limits.—Ed.

ben 'Abdallah described his intended route as follows:—the first day's journey to Túkam; the second to Jebel 'Aḳár; the third to Wáṣel; the fourth to Raïdah, a place of considerable extent belonging to the Yakís; the fifth day arrive at Sá'ah, of the Yabarí tribe; the sixth day at 'Abd al Betí, inhabited by Al Tatamín Eïwarmás; the seventh, Tarbál; the eighth, Siḥún; both the last possessed by the Yáfa'ís. Allowing 20 miles a-day for the camel's journey, this would be 160 miles' journey from Makallah; a courier can accomplish it in 4 days. The usual estimate of the distances from Siḥún, the capital of Ḥadramaút, to the different towns, is said to be as follows:—to Dau'an 36 hours; to Tarím 6 hours; to 'Aïnát, 26 hours; to Shibám 24 hours: the whole province is represented as fertile, the towns and villages populous, abundance of water and date-groves.

The appearance of the natives of Ḥadramaút that we saw was favourable; handsome features, slight made, active men, well armed with matchlock and krís, ornamented with gold or silver.

From Rás Makallah the coast extends to the N.E. in an almost unbroken line of low sand for 40 miles, as far as the cliffs of Ḥámí; the edge of the 20-fathom bank of soundings generally lying about 2 miles off-shore, and dropping to 100 fathoms, at 4 miles' distance; clear bottom of sand and shells. Immediately to the N.E. of Rás Makallah the small anchorage of Bander Roweïní affords shelter for bagalás against the S.W. monsoon. Two miles farther is the village of Rághib, with a large ancient mosque; this coast abounds with fish, and the whole of the inhabitants of the village appeared to be fishermen.

Bú Heïsh, 3 miles beyond, is a village surrounded by date-trees in a well-watered valley, about 1½ mile from the shore.

Shehr, once a thriving town, but now a desolate group of houses, with an old fort, lies close to the shore in lat. 14° 38′ 30″ N., long. 49° 27′ 35″ E. This was formerly the residence of the chief of the Kaṣá'idí tribe, but the village has now dwindled to about 300 persons, chiefly fishermen.

Súku-l-Baṣír is a small town lying inland, about 4 miles N.W. of Shehr; it is said to contain 4500 inhabitants: its mosques may be distinctly seen above the date-groves from the sea, and the valley appeared extremely luxuriant. Much tobacco, plenty of vegetables, good dates, and pure water may be obtained here. Five miles farther to the N.E. the oblong, table-topped hill of Jebel Ḍheb'ah (Hyæna Mount), entirely separate from all other hills, rises close to the shore: as it is visible at some distance, it forms a good landmark for making Makallah from the eastward.

Zakfah is a pretty village surrounded by date-groves, on the shore, 4 miles farther E., and Máyariyán, 2 miles beyond, is a ruined village, abundantly supplied with water.

Shehr, the chief town of the district of this name, extends one mile along-shore, with a fortified castle, the residence of the sultan, on an eminence near the centre, in lat. 14° 43′ 40″ N., long. 49° 40′ E., and is visible from seaward before any other object in the town. Here is a mosque and a custom-house; the town is built in the shape of a triangle, and, though the dwellings are much scattered, they are tolerably spacious and comfortable; the population is about 6000. Supplies may be easily obtained here, but the water is not good. Shehr is a place of much trade; its manufactures are chiefly coarse cotton cloths, gunpowder, implements of war, &c. The duties on exports and imports amount to about 5000*l*. annually.

The anchorage off Shehr is only an open roadstead; clean bottom of sand and shells in 7 and 8 fathoms, from ¾ to 1 mile off-shore.*

Four miles N.E of the town is the hill of Yakalif, on which are the remains of a wall and a terrace: this hill forms a good landmark for making the place.

The sultan of the Hamúm tribe, Sheïkh 'Alí ibn Násir, is a young man under 30 years of age, and is very superior to the generality of Arab chiefs: he is able to muster 7000 matchlocks in case of war.

The Hamúm tribe is subdivided into the following lesser tribes:—

Beït 'Alí (Tent of 'Alí),	Beït Subhí,	Barwákhí,
— Aghraf,	— Hamúdíyah,	Sa'il,
— Ghoráb,	— Sheneïn,	Hakkam.
— Bú Salih,	— Karzet,	Hur.

We were also given the names of the following towns and villages in this territory, besides those already, or to be, described:—

Defeïghah,	Karadah,	Zaghafah,	Mayán 'Abáduh,
Sewán,	Taballah,	Sa'íd,	Ma'du',
Nagkar,	Wásalat,	Dau'an,	Ararah,
Ariyah,	Arab,	Meyú	Musayyid.
Tiklidah,	Bú'ísh,	'Aríf,	

Hámí, the next village, 13 miles farther to the eastward, lies just below the dark double hill of the same name, in a picturesque ravine, with a date-grove and cultivated ground near the beach; its population is about 500; supplies are not easily obtained; fishing seems the chief occupation of the inhabitants. Hot-springs are numerous near Hámí; those I examined stood at 140° Fahr.

Between Hámí and Rás Sharmah, 9 miles farther E., the coast forms a bay 2 miles deep with sandy bottom and regular sound-

* A plan of the town and roadstead of Shehr accompanies Captain Haines's chart.

ings; in the bight of the bay, on a rocky eminence ½ a mile from the coast, stands the ruined fort of Hisn el Misenát, and between this point and Rás Sharmah lies *Sharmah Bay*, considered the best on the coast for shelter during the N.E. monsoon. Along the shore of this latter bay are the ruined fort of Mughrá, the ruined mosque and village of Kalfah, and El-Gharm, a small fishing village; while inland at 2 miles' distance is the walled town of Dís, containing 1000 persons and some hot-springs. In 1836 the Daulah or governor here was named Aïwás ibn Ahmed, who was very civil to the officers who visited him; but the legitimate chief is Mohammed 'Omar ibn 'Omar, the owner and captain of a fine ship, which command he prefers to that of an unsettled government.

Dhabbah, a village 4 miles farther inland, surrounded by date-groves, is noted for its hot springs, of peculiar efficacy in rheumatic complaints.

Rás Sharmah is a small headland projecting to the S.W., and forming the eastern limit of the bay; the point lies in 14° 48′ 30″ N., long. 50° 2′ 30″ E.; immediately N. of it a hill named Chehár Saber* rises 170 feet above the sea; and 700 yards W. of the extreme point of the cape lies the small rock called Jezírah Sharmah, 70 feet high. It is high-water here on full and change at 9h.; rise and fall 8 feet; variation in 1835 was 4° 39′ W.† From Rás Sharmah the coast runs nearly due E. for 8 miles, presenting a succession of limestone and chalky cliffs rising almost precipitously 400 feet above the sea.

Rás Baghashú', a rocky cape 300 feet high, is the eastern termination of this bold shore, and lies in lat. 14° 49′ 10″ N., long. 50° 9′ 30″ E.: a miserable village of the same name stands a little to the eastward; and 4 miles to the westward, in a gap of the cliffs, is another small village called Dhafghán. About 3 miles to the northward is Jebel Hamúm, a hill, near which we found some inscriptions in the same character as those of Hisn Ghoráb,‡ &c.: here also are several springs of good water and considerable cultivation.

A lofty range of mountains extends in the direction assumed by the coast, varying from 10 to 15 miles' distance from the sea: commencing to the eastward of Makallah, they bear the name of Jebel Jambúsh, then Jebel ibn Shamáyik, with a remarkable bluff towards its eastern end on a still more distant range: then follow Jebel Asad, (Mount Lion,) which stretches away to the north-eastward towards Rás Fartak.

* This is a Persian, and therefore not the native name.—F. S.

† A plan of the bay and cape of Sharmah, on the scale of 1 inch to a mile, is annexed to Captain Haines's chart.

‡ See London Asiatic Journal for 1838, p. 91.—Ed.

The Beït 'Alí subdivision of the Hamúm tribe have great influence along this part of the coast; their sheïkh, Ḥasan ibn 'Alí, is a man of ability and courage, and commands 1000 matchlocks, a force sufficient to make a chief much respected and feared by his weaker neighbours.

Thirteen miles of low sandy coast in an E.N.E. direction bring us to the sandy cape of Rás Ḳosaïr; and 1 mile due N. of the point is the small town, or rather village, of Ḳosaïr, containing several stone buildings, but chiefly huts; its population is estimated at 300 of the Beït 'Alí and Beït Ghoráb tribes. The highest house in the centre of the village is in lat. 14° 54′ 40″ N., long. 50° 21′ 50″ E. The natives have a few boats, and catch abundance of sharks, the fins and tails of which find their way, *viâ* Maskaṭ and Bombay, to the Chinese market, and fetch good prices.

Half a mile to the N.W. of the village is a ruined square fort and a date-grove, and 2½ miles in the same direction is the scattered hamlet of Ḳoreïn. Immediately to the S.W. of the cape a rocky shoal extends for ½ a mile.*

For the next 30 miles the same description of low, sandy coast continues to the north-eastward, forming a slight curve, in which the chief place is

Raïdah, a small town of 700 inhabitants on the sea-coast, only noted as the residence of the sultan, 'Alí ibn Abdallah, &c., a descendant, it is said, of one of the principal chiefs of Southern Arabia. The present chief is a man of about 50 years of age, and is much respected; he is of the Ḳasáïdí subdivision of the Hamúm tribe, and his territory extends from Rás Baghashú' to Misenát, a sea-coast of about 35 miles. Frankincense, aloes, ambergris, and sharks' fins are the chief articles of export. Here are about 30 boats.

The villages of Raidah, Ṣeghír, or Serrár, of 80 people; of Ḥarrah, conspicuous for its round tower; and the ruined fort of Ḥuseïn el Kathcrí, lie on the coast between Ḳosaïr and Raïdah.

Misenát is an old ruin on the coast, 13 miles E. by N. of Raïdah, and lies in lat. 15° 3′ N., long. 50° 43′ 25″ E. Here is a spring of excellent water, but the land is swampy and abounds in mangrove-trees. The remains would indicate the site of a town of some size, and we were told that coins and other things have been picked up here, and amongst them a pair of scales. It is melancholy to find this interesting coast, which in former days was probably fertile and populous, now almost entirely desolate; and the few inhabitants that remain nearly always at strife with their neighbours.

At this place a party of officers, consisting of Lieut. Sanders,

* An enlarged plan of the shoal and of the village of Ḳosaïr accompanies Capt. Haines's chart.

Dr. Hulton, and Mr. Smith, left the *Palinurus* and proceeded about 10 miles inland to Wádí Sheïkháwí, 3 miles distant from the village of Mayokí, where they discovered some inscriptions similar to those found at Hisn Ghoráb,* &c. The valley is said to be fertile and to contain numerous villages. Wádí Sheïkháwí may be easily distinguished by a remarkable gap in the mountains that encompass it.

The coast between Misenát and Sihút is low and dreary, with a gradual ascent to the Sheïkháwí mountains, the eastern termination of which forms the western side of Wádí Masellá.

The Mahrah territory here commences and continues to the eastward nearly as far as Marbát.

'Abdu-l-Kúrí, or *Palinurus* Shoal, a dangerous patch lying off this part of the Arabian coast, was unknown to both Arab and European navigator till this survey in 1835; an old fisherman, who had lived many years in this neighbourhood, pointed it out to me as a place where I should be likely to catch plenty of sharks, and it was not until after a difficult and tedious search, and struggling against a current running 3 miles an-hour, that we were able to strike soundings upon the shoal spot. The shallowest part of this newly-discovered shoal is a pointed rock with only 4 fathoms water on it,† and lies in lat. 14° 54′ 50″ N., long. 50° 45′ 20″ E., determined by observations made on the spot by Lieut. Jardine (an excellent and accurate observer) and myself, and agreeing by trigonometric and chronometric measurements within a few seconds. The variation of the compass, by means of twenty-three observations in 1835, was 4° 26′ westerly.

The shoal extends for 1850 yards in a N.N.E. and S.S.W. direction, and is from 300 to 600 yards broad, with a bottom of alternate rock and coral. The soundings round the shoal cannot be relied on, as they vary suddenly, and do not always decrease on approaching it. The nearest land is at the old ruin of Misenát, distant 8½ miles, and bearing N. by W., being almost in a transit bearing with the eastern bluff of Sheïkháwí Gap. From the shoal the sandy beach on the mainland is not visible.

The fishermen assured me that forty years ago there was more water on this spot, and at that period no coral could be perceived at the bottom. The soundings, measured from the shoal spot, gave 80 fathoms at 1 mile distance to the S.W., and 64 fathoms at 2 miles distance to the S.E.; in every other direction they exceeded 100 fathoms at this distance; at 2 miles distance from the shoal spot towards the shore the soundings were 120 fathoms.

From the accounts we received of it, and the opinion we were enabled to form, I strongly recommend navigators wholly to avoid

† Least water marked in chart as 17 feet in 1835.—Ed.
* See London Asiatic Journal for 1838, p. 93.

this spot, either by keeping the land well aboard, and so passing between it and the shore, or else to keep a good offing, say from 12 to 15 miles from the coast, as there seems reason to believe that the shoal is gradually becoming more shallow.

Subjoined are the chief positions determined during the survey.

Name of Place.	Exact Point.	N. Lat.	E. Long.	Height in feet.
		° ′ ″	° ′ ″	
Ras Bab-el-Mandeb	Manhali Peak	12.41.10	43.32.14	865
Perím Island	Pyramid at N.E. angle	12.39.20	43.28.50	230
Rás Sejan	Summit of centre	12.28.22	43.22.50	380
Jeziratu-s-sab'ah [Brothers]	Summit of High Brother	12.28.00	43.28.50	350
Rás 'Árah	Low point of Cape	12.37.30	44.01.40	
Jebel Kharaz [St. Antonio]	Southern Bluff	12.41.00	44.16.00	2085
Rás Ka'ú [Black Cape]	Cape	12.39.45	44 32.30	
Rás 'Amrán	S.W. point of island	12.43.30	44.49.40	
Jebel Hasan [Sugar-loaf]	Highest point	12.44.50	44.58.40	1237
,, [Ass's ears]	Eastern peak	12.44.35	45.01.00	700
Rás Mujallab Heïdí	Point	12.43.00	44.59.00	
Jebel Shamshán	Summit	12.45.30	45.08.00	1776
Rás Sinaïlah [Cape Aden]	South point	12.45.10	45.09 00	
'Aden (town)	N. point of Sírah Island	12.46.15	45.10.20	
Lahaj (town)	Centre of west side	13.02.00	45.00.30	
Rás Seilan	Low eastern cape	13.03.30	45.28.30	
Sughrá (village)	Sheikh's castle	13.21.30	45.46.00	
Jebel Kharází, or Fudhlí	Western summit	13.31.30	45.59.00	5442
Makâteïn	Point	13.24.30	46.32.00	
Howaïyah (town)	Sheikh's house	13.28.45	46.47.25	
Jebel Hamarí	Summit of peak	14.03.30	47.37.30	5284
Rás el 'Asídah	Hill at point	13.57.00	48.15.20	160
Jebel Hisn Ghoráb	Eastern point	13.59.20	48.24.30	464
Sikkah, or Jibús Island	Centre	13.54.40	48.28.20	450
Rás el Kelb	Low cape	14.01.40	48.46.50	
Rás Burum	North rocky cape	14.18.30	49.03.25	
Makallah (town)	Governor's house	14.30.40	49.11.48	
Shehr (town)	Centre	14.43.40	49.40.00	
Rás Sharmah	Point	14.48.30	50.02.30	
Rás Baghashú'	Cape	14.49.10	50.09.30	300
Kosaïr (village)	Centre	14.54.40	50.21.50	
Misenát (ruin)	Centre	15.03.00	50.43.25	
'Abdu-l-Kúri, or *Palinurus* Shoal	Shoalest spot	14.54.50	50.45.20	

[It is due to Captain Haines to state that the above account has been very much abridged from his detailed memoir, in order to bring it within the limits necessarily prescribed by this Journal; yet it is believed that no fact of any importance has been omitted, and that such general directions will still be found as will be sufficient for the guidance of the navigator along the southern coast of Arabia. The original chart, on a scale of 6 inches to a degree, together with the various plans, will shortly be published by order of the Court of Directors; and the survey of this coast, made under its orders, is a valuable addition to hydrography, which reflects great credit on the Indian Navy, but more especially on Captain Haines and the officers of the *Palinurus*.]

VI.—*Some Remarks on a Short Vocabulary of the Natives of Van Diemen Land; and also of the Menero Downs in Australia.* By Dr. John Lhotsky, F. R. Bot. Soc. of Bavaria.

Although more than half a century has elapsed since colonization commenced in Australia, we are still very ignorant of the languages and dialects spoken by the natives of that extensive country. With the exception of Mr. Threlkeld's Australian Grammar, compiled at Lake Macquarie; a short Vocabulary of the natives of King George's Sound, at the S.W. angle of the island, by Mr. Scott Nind;* and a few words printed in Captain Dumont D'Urville's account of the *Voyage de l'Astrolabe,*† I am not aware that anything has been published on this head: yet it is a subject that cannot but be highly interesting to geographers, as probably affording a clue to the solution of that difficult geographical problem—the origin and migration of nations.

Such considerations may give a value to the following short vocabularies which they otherwise might not possess. The Australian Vocabulary was compiled during a journey I made to the Menero Downs, lying about 200 miles S.S.W. of Sydney, in the year 1834. On this journey I ascended Mount Bulka,‡ one of the highest points of that mountainous region, lying in the south-eastern angle of the island, marked in our maps as the Australian Alps, and which, if we may rely upon the height indicated by the temperature of boiling water, would give an elevation of upwards of 8000 feet, as water boiled at the temperature of 196° Fahr.

It was on the Downs, at the foot of these mountains, that I obtained this vocabulary from young people between the ages of thirteen and nineteen, who, as I have observed elsewhere,§ are always the most intelligent and communicative: the words *snow* and *ice,* found in the list, will show the localities to which these tribes occasionally resort; localities which, perhaps, may not exist elsewhere in Australia. In writing down the words I have, for simplicity's sake, invariably adopted the sound of the vowels as in Italian, or as in the English words, *father, there, fatigue, cold, rude;* the consonants are to be sounded as in English, except the termination in *ng,* which has a nasal sound resembling the *ão* in Portuguese; several syllables also commencing with the letter *j* would be far more accurately rendered by the Polish *dź,* which has no exact equivalent in the English tongue. In Australian words the emphasis falls usually on the penultimate syllable; the general sound has the common, rough, coarse, unorganized character of other uncultivated languages, and, especially

* Geographical Journal, vol. i. p. 47.

† Philologie, vol. ii. p. 6.

‡ The general name for mountains in New South Wales.

§ Australian Alps, p. 41.

when the natives quarrel, it sounds like a huge rattle. The people are not very loquacious, except the children; and I often observed the chief and his two spouses to sit for hours without uttering a word.

The Van Diemen Land Vocabulary was obtained by me at Hobart Town, in 1836, from Mr. M'Geary, who had been upwards of twenty years resident in the island, and is well acquainted with the language and manners of the people.

When we consider that, notwithstanding all the kindness now shown to them, these aborigines are fast perishing away, and that the whole number on Flinders Island does not amount to one hundred persons, this short vocabulary becomes of more value, especially as we possess none but about seventy words given by Labillardière, and 100 words procured in the *Voyage de l'Astrolabe*, from a Van Diemen Land woman then living at King George's Sound.

[The Society is indebted to Mr Robert Brown, the companion of Flinders in his memorable voyage, for a list of about 200 words, obtained by him from Mrs. Paterson, widow of the late governor, when he was at Sydney, in 1803; the vocabulary is drawn up in French, and bears the name of Peron, an. X. Repub., compiled from the inhabitants of Van Diemen Land and the Isle of Marian:—it is placed in the comparative list, under the date of 1803; most of the words agree with those given by Labillardière. A few words are added, which were obtained in 1838 at Adelaide, South Australia, by Mr. G. Windsor Earl; apparently, they have no resemblance to the language spoken elsewhere in Australia, as far as our knowledge extends.]

E. and W. imply respectively the East and West side of Van Diemen Land.

English.	Meneio Downs.	Van Diemen Land.		Adelaide, S. Australia.
		1835	1803.	
Arms		Abri (W.)	Guna-lia *	Turriti
Beard	Yarang		Kougine	Multa
Ear	Gundungela	Pitserata	Cuengi-lia	Iii ?
Elbow ?	Yongra	Rowella (W.)		Tiingi
Eye	Mekeleit ?	Lepina	Nubere	Mina
Foot	Mondeng	Langana		Tinna
Hair	Yarang	Zitina	Cililogení	Yuka
Hand	Moianga	Anpmana	Ri-lia	Murra
Knee	Karagarab	Minebana	Ranga-lia	Multa
Leg	Dara	Latanama		Irako
Nose	Nurnana	Minqrara	Mugid	Mula
Teeth	Uranganabili	Yana	Pegi	Tial
Tongue	Talang	Mina	Mene	Taling
Thigh	Dara	Tula		Kundi

* *Lia* appears to be a plural termination.

English.	Menero Downs.	Van Diemen Land.	
		1835.	1803.
Ankle			Lure
Belly	Bindi	Kaviranára (W.)	
Breast	Pinenana	Voyeni	Lere
Chin	Undogera	Kamnina	Onaba
Eyebrow	Mimorung	Tipla (W.)	Lihe nubera
Face		Niperina Manarabel (W.)	
Fœminina		Tibera	Megua
Heel			Laidoga
Lips	Tambamba		Mogudi lia
Nails	Ulinala		Toni lia
Navel	Niurung		Liué
Neck	Unananana Wadyidya	Lepina Denia (W.)	
Posteriora	Tumun	Wobrata	
Virilia	Jabijang*	Lipi	
Clouds	Kulumbeo	Limeri	
Day	Nangeri	Megra	
Fire	Kembi	Lope	Une
Lightning	Kurungeran		Une bura
Moon	Kabatá	Vena	
Night	Direit. Wallund		Burdunya
Snow	Gunyimá	Oldina	
Star	Jinji	Potena. Marama	
Sun	Mamadi	Piterina	Panubere
Thunder	Meibi		Bura
Earth	Bring	Natta	
Ground	Taura	Gonta	
Rock	Kurrubang	Megog	
Stone	Tunung. Gibba	Nami	Loine
Water (fresh)	Wadyang	Lugana. Moga	Lia
Acacia	Nirwan		
Bark	Parrunga		Une bura?
Branch	Palluk		Porshi
Grass		Rodedana. Publi	Poene
Casuarina, fruit of			Lubada
Leaf	Kundika		Driué
Tree	Waddi		Luparí
Wood	Kayora†	Mumanara (E.)	Gui
,, charcoal	Mundaith		Loira
Boy	Bubel	Plireni	
Brother	Didya	Pleaganana	
Old man	Yong	Lalubegana	
Bandicoot	Manyoc	Padana	
Dog (native)	Warragulmongi	Leputalla (E.)	
Emu	Biddibang	Rakana	
Kangaroo rat	Kunimein	Riprinana	
Opossum	Buckani	Millbaina	
Crow	Wagulin	Kella-Katena	
Hawk	Miuro	Ingenana	

* The Polish Z′ expresses the sound better than the English J.
† At Adelaide, wood is called kurra.

English.	Menero Downs.	Van Diemen Land. 1835.	Van Diemen Land. 1803.
Swan	Goniak	Rowendana	
Parrot	Kulitkat		Girgra
Fly	Nako		Oille
Oyster	Taralangana		Lonbodia
Frog	Yerrigereit	Pulbena	
Snake	Tidyuka	Katal	
Canoe		Lukrapani	Nenga
Beads	Droyoyelak		Perelede
Drink (to)	Uikimá	Lugana	Laina
Evacuate (to)		Legard	Tere
Laugh (to)	Brigang		Drohi
Call (to)	Viribinela		Toni
Run (to)	Monri	Moltena. Mella	
Sit down (to)	Malaki	Mevana	Medí. Melitó
Weep (to)	Wabmalanga		Tara
Die (to)	Birraganya		Mata
Sleep (to)	Kumong		Makunya
Little	Narang. Miti	Lavara	
One	Mivan yalla		Marai
Two	Mivan bulla		Bura
Three	Mubiak		Alirí
		English.	*V. D. Land*, 1835.
Back	Kungun	Fine day	Lutragala
Eye-lid	Daran	Fog	Mina
Eye-lash	Mobeva	Frost	Oltana
Forehead	Ullo	Night	Levira
Heart	Tuntungeran		
Liver	Nako	Country	Walana-lanala
Mouth	Yabu	Island	Lirevigana
Shoulder	Galonénana	Mountain	Tráwala
Temples	Wangula lula	River	Waltomana
Windpipe	Mokmok	Rivulet	Montemana
Wrist	Gonéna	Water (salt)	Moahakali
Cold	Karet	Grass-tree*	Komtenana
Hail	Dondola	Forest	Lovregana
Ice	Quidong	Oak	Lemena
Sky	Pogrein		
Wind	Tawerong. Warrineb.	Father	Mumlamána
„ strong.	Kurubmang	Girl	Sudinana
		Man	Lusivina
Box tree	Kanea Yarma	„ black	Vaiba
Banksia	Pirruka	Mother	Tattana (W)
„ fruit	„ Atyaggo		
„ honey	„ Goa		Pulbena
„ seed	„ Yua	Badger	Napanrena
Gum tree	Nirwan	Cat (native)	Lila (E)
„ white	Bridgaoug	Kangaroo	Lelagia (W)
Kangaroo grass	Mallak	„ pouch	Krigenana
Tea tree	Gambar	Porcupine	Tremana
		Seal	Kuteila
Lad	Warrambel		
Young man	Yereng	Drake	Malbena

* Xanthorrhœa.

English.	Monero Downs.	English.	Van Diemen Land, 1835.
Sister	Nama	Goose	Robengana
		Gull	Rowenana
Bird's bill	Mundu	Hawk (black)	Putuna
„ claw	Gino	Magpie	Ken[illegible]ra
„ feather	Kilhgila	Mutton bird	Yavla
„ tail	Pembingo	Pelican	Thudena
„ wing	Gungudulongo		
Cockatoo	Hannal	All round	Mataira
„ black	Gnina	Bad	Katea
„ white	Ger	Chief	Bungana
Duck	Kuraiiga		Comtana (E)
Pigeon	Wabangla	Devil	Nama (W)
		„	Rediarapa (S)
Beetle	Urrugagan	Dry	Katribiutana
Butterfly	Jiribal	Flying	Pinega
Lizard	Moga	Handsome	Marakupa
Snake (black)	Mottu	High	Vatina
„ (diamond)	Mallavah	Less	Tavengana
Spider	Mariar	Low	Lutece
		Old	Petebela
Kangaroo milk	Amagnang	Stout	Canola
„ paw	Mariangaong	Sultry	Ratavenina
„ tail	Kumiango	One side	Mabea
Rat (species of)	Chitiba		
		Ashamed (to be)	Vad[illegible]burena
Belt	Kumel	Come (to)	Tipera
Dance (native)	Tibiribi	Fight (to)	Menana
Frontlet	Bolombang	Get (to)	Mengana
Net	Bayken	Go!	Kabieti!
Ornaments	Bunumerang	Know (to)	Tunepi
Pipe-clay	Miridni. Kobat	Shout (to)	Karni
Red ochre	Neir	Stop (to)	M[illegible]kiopani
Song	Yangang	Walk (to)	Tabelti
Shell for spoon	Bindugang	I tell you	Mena lage'a
Spear	Jivim	I will go and hunt	Mena malaga latia
„ rest for	Kutma		
Tatoo marks	Maruyerang	Cape Grimm	Pilni
Vessel for water	Kuliman	Circular head	Malutá
Weapon (half moon)	Bumering*	Mersey river	Painápel
„ another	Hiliman	Port Sorell	Panataní
Good	Budgony Narrak		*V. D. Land*, 1803.
White	Hogeila	Eucalyptus	Tara
Wicked	Tussi. Baka	„ seed of	Monodadro
Large	Kabon	„ trunk of	Pirabe
Very	Marei	Moss	Manura
Four	Nalanko	Fucus palmatus	Rugona
Five	Guba	Seaweed	Roenan. Inu
		„ dried for eating	Rori
Break (to)	Par		
Burn (to)	Walta	Head	Cuegi
Bury (to be)	Kundeit	Family	Tagari-lia
Charm for rain (to)	Dutmenei	Wife	Cuani
Cry (to)	Nimili		
Cry out (to)	Wadyembuli	Bird	Muta-Muta
Eat (to)	Patta	Parakeet	Mola
Get up!	Dubi!		

* A barbarism, for Turrama. See Threlkeld's Australian Grammar, p. xi.—Ed.

English.	Monero Downs.	English.	Van Diemen Land, 1803.
It is right!	Abili!	Crab	Renorarí
Lie down (to)	Gamburimi	Fish (gadus)	Punerala
Make haste!	Kokoi! Barabanay!	Haliotis	Caene
Paint (to)	Murugembeli	Lobster	Nuele
Quarrel (to)	Nolonyula	Oyster shell	Luba
Scrape (to)	Takumilin	Star-fish	Onerí
Sick (to be)	Bugel. Kayar		
Speak (to)	Payola	Insect	Paroe
The fire is out!	Takayá!	Louse	Nure
This will do!	Bundat!	Basket	Terri
	——	Bottle	Luga
	V. D. Land, 1803.	Sand	Gune
Give me!	Noki	Weapon	Le
Go and eat!	Matgera	Yellow ochre	Malane
I will eat it	Madegcra	Cloak of Kangaroo skins	Boira
I see	Rendera		
I do not know	Nideje	Afar off	Renene
I do not understand	Nidejó	I	Mana
Let us go away	Tangara	Me	Pawahi
Put wood on the fire	Treni	You	Nina
This way	Lone	No	Nendi
That belongs to me	Paturana	Yes! good!	Erre
That kills	Mata e nigo	That	Avere
What do you call that / What is your name	Wanarana	This	Lonoi
		Beat (to)	Kindrega
Will you come	Canglonao	Blow (to)	Bure
Burn oneself (to)	Laguana	Slap (to)	Noeni
Cut (to)	Rogerí. Yordí	Spear (to)	Kie
Dance (to)	Ledrae	Strangle (to)	Lodamerede
Dine (to)	Bugure	Tatoo (to)	Palere
Fall (to)	Midugiya	Tie (to)	Nimere
Grease the hair (to)	Tane poere	Tear (to)	Ure
Jump (to)	Waragra	Throw (to)	Pegara
Kick (to)	Vere	Untie (to)	Laini
Kneel (to)	Guanera	Upset (to)	Moido-guna
Play (to)	Pass	Warm oneself (to)	Gagvui
Polish (to)	Rina	Whistle (to)	Menne
Sing (to)	Ledrani		

Names of Natives in Van Diemen Land (1835).

Chief of Bye River	Mampoliata	Minetela	Turi
„ Brunet Island	Oredia	Natogavena	Tuvolin
„ Cape Grimm	Laratani	Piakuka	Umarra
„ Emu Bay	Nukanamuk	Rolamanablena	Varamunu-luvena
„ Oyster Bay	Tupralanta	Rolapena	Vatarata-runa
„ Port Davy	Títara	Rumenentula	Yaratari
„ Robin's Island	Bendgraducka	I see a vessel on the water sailing fast, but a long way off at sea.	Mena laprea lukrapaui tokari poveleta mavokarlena maunta.
„ Slaney Creek	Matealangana		
Lakolá	Towganarapoholka		
Lakovella-vellena	Trallaruna		

A detailed and curious account of the manners and habits of the aborigines of Van Diemen Land, drawn up by Mr. Robinson, who has long acted almost as a father to these poor creatures at Flinders' Island, and is intimately acquainted with their language and customs, has been sent home to Her Majesty's Government. Measures have been taken to obtain from him a more extended vocabulary of their language; and, if successful, the results will be communicated to the Society.—Ed.

VII.—*Notes on a Journey to Kordofán, in* 1836-7. By Arthur T. Holroyd, Esq.

[Read 25th February, 1839.]

It was not until I had arrived at Wádí Halfah, at the second or great cataract of the Nile, in lat. 22° N., that I finally resolved to penetrate into the Beléd-es-Súdán (countries of the Blacks), and even then I did not anticipate prosecuting my journey beyond the ruins of Musawwerát,* in the neighbourhood of Shendí, or at the utmost to Khartúm (Proboscis), the seat of the Pásha's government for the provinces to the south of the second cataract. The sequel will show that I visited Sennár, and then proceeded to the west to El 'Obeïd,† the capital of Kordofán.

In the afternoon of December 5th, 1836, having engaged camels at 35 piastres each, I left Wádí Halfáh, accompanied by Hájí Suleïmán my interpreter, and 'Alí an inferior domestic; and, having crossed the Nile, determined to take the road on its west bank to New Dongolá (Donkolah). Our route lay through Abú-sír, Tahtí, Kagmí, Semneh, Askur, Melik-en-nasr, and 'Okmeh, all small villages consisting of only a few huts: at this latter place there is a hot saline spring close to the river; it is about 4 miles S. from the village. A small quadrangular burnt-brick ruin, without either door or window, but with an opening at the top, now nearly closed by the drifted sand, shows that this was, in all probability, anciently used as a bath. At the back of this building is the principal spring, which is so close to the edge of the river, that it must be concealed during the inundation. The temperature of this water at its source is 130° of Fahrenheit. Smaller and more insignificant springs ooze through the ground on each side of the principal one to the distance of 250 paces, and the saline matter left by the evaporation gave the bank a frosty appearance. The peasants of 'Okmeh have an idea that the hot spring comes under ground from the Oasis of Selímah, 70 miles to the W., where there is abundance of muriate of soda in a state of great purity; and I afterwards asked an intelligent camel-driver, who had made many excursions to Selímah, at what point he thought he should come upon the Nile if he travelled due E. from Selímah, and he replied at 'Okmeh. This is strongly corroborative of the position of Selimah laid down by Mr. W. G. Browne, and of its position relative to 'Okmeh as given in Mr. John Arrowsmith's map. From 'Okmeh we passed through Dál, Sákiyet el Abt, Deïr Hamíd, Sedaënga, Dóshe, Soleïb, Kóyeh, Tinárch, Gurgód, Saesa, Marakol, Hanneck, and

* Musawwerát, "the figured (buildings)," is misspelt, as is often the case, in M. Cailliaud's table of proper names.—F. S.

† Vulgarly pronounced L'obeyet: it means "the little slave."—F. S.

Hafír, to New Donkolah, which I reached at noon on the 22nd of December. The journey is usually performed in ten days, but I stopped on the road to examine all the antiquarian remains.

U'rdeh, A'gí,* Marákah,† or New Donkolah (for it is known by all these names), has sprung into a place of importance within the last twelve years. The population is estimated at 6000, including 800 troops, their wives and families, an estimate which appeared to me much too high. The number of Copts is about 100. The bázár is daily increasing, and is supplied from Cairo; the principal articles brought from thence being shoes, printed cottons, calicoes, sugar, rice, cloth, hardware, &c. The duties upon goods entering New Donkolah are heavy, so that articles of consumption are dear, in many instances treble or quadruple what they are in Cairo. Donkolah can boast of a coffee-house. The government is at present building baths, and there is already a large manufactory for indigo. The thermometer on Christmas-day stood in the shade at 2 P.M. at 86°, and at 8 P.M. at 80°. The position of New Donkolah, as stated by M. Linant, is 19° 7′ 30″ N. lat. and 29° 54′ 35″ long. E. of Greenwich.‡ The town is placed on the edge of the river, the banks of which, when the water is lowest, are about 25 feet high, and I should think that the Nile rises here about 18 or 20 feet.

On the 31st of December, having procured a boat, I left New Donkolah, and on the afternoon of the 3rd January, 1837, I reached Old Donkolah. The town is in ruins, and does not contain a population of more than 300. The most striking object here is a mosque on rather an elevated site, from the top of which there is an extensive prospect of the arid Desert and meandering Nile. The sand is of a very bright yellow colour, and has accumulated in such quantities as in many places to conceal the houses; its surface being level with their roofs, and the entrance to the apartments being through the ceiling of the rooms. There is no land capable of cultivation near the ruined town; in short, almost all the east bank of the river, between Old and New Donkolah, is covered with drifted sand, and rare is it to see even a few feet of cultivable soil. Our direction from Old Donkolah was S.E., then due E. until near Ambukol, whence we travelled a few miles a point to the N. of E.

The only object of interest in the neighbourhood of Ambukol is a portion of desert near the river, about 8 miles W. of the village. This waste is called *Haagbarlak.* The superficial stratum here is a coarse sandstone, curious and interesting from its

* The court, a Turkish term.—F.S.

† Capital of one of the ancient ecclesiastical divisions of Nubia (Quatremère, Mémoires sur l'Egypte et la Nubie).—F. S.

‡ Dr. Ruppell gives its lat. 19° 10′ 19″, long. 30° 22′ 15″ E.

containing many siliceous fossil trees. I observed five or six, the largest of which, situated 20 minutes' walk from the river, is 51 feet in length and 20 inches in diameter at its largest extremity. It is partially buried in the sand. The peasantry splinter off fragments and use them for gun-flints, and to strike a light. It appeared to me that these fossils were dóm-trees (Cucifera Thebaïca).

On the 8th of January I arrived at Ambukol, and a severe attack of fever arrested my progress until the 24th, when, being sufficiently recovered, I resolved to cross the desert of Bayúdah* to Khartúm, a route, I believe, not previously passed by any European traveller. Thermometer 75°. I engaged camels at 25 piastres each from Ambukol to Khartúm. My first day's journey was short, as first day's journeys always are in the East; and I rested for the night, after travelling 2¾ hours, at a place to which the Arabs have given the name of Berj el kurán (Koran tower).

On the 25th I travelled 7½ hours, and rested at Khór-el-ghaním. On the 26th 9 hours to Abú Samúd.

On the 27th, in 3 hours we reached the wells of Bayúdah. Many wells have been sunk, but we found water only in three, and in very small quantities. The water is good, free from any brackish taste, thick, and of a deep yellow colour, deriving these latter properties from the soil through which it passes. The water which we had brought from the Nile was putrid and nauseous, and we were glad to avail ourselves of the opportunity of procuring a fresh supply. We were delayed several hours in taking a small quantity. the wells having been visited during the morning before we arrived by Arabs, who had drawn largely upon the springs for their goats, sheep, asses, and camels. These are the only wells between Ambukol and El Hajír; the latter the point at which we met the Nile again. In the afternoon we resumed our journey, crossed a small ascent of about 70 feet, and rested for the night, after 3 hours, at Khór-el-Laban. The distance on the 27th, six hours (18 miles). On the 28th, 8¼ hours, to Kús Abú Deluah. On the 29th, 7 hours to El Atherleh. On the 30th, 8 hours to El Gharah.

On the 31st, in 3½ hours we arrived at the Nile, leaving the Desert between two rocky hills, El Hajír, about 150 feet high, on the right, and Jebal-el-Róyán (situated on an island of the same name), about 250 feet high, on our left.

I crossed the desert of Bayúdah, as I have shown, between Ambukol and El Hajír, and the journey is usually performed in seven days, though it might with ease be made in six. It is flat, with few hills, and those small and of easy ascent. After leaving Ambukol, the surface is alternately sand and gravel, but the sub-

* بيوضه from its whiteness.—F. S.

stratum is sandstone, and continues to be such till within an hour of reaching Abú Samúd, where we came upon grey granite, furrowed by veins of primitive quartz. The gravel, both to the N. and S. of Abú Samúd, contains quartz pebbles in great abundance; and I noticed also portions of siliceous fossil trees, similar to those observed at Haagbarlak. At Abú Samúd, the wells of Bayúdah, and in short as far as El Hajír, sandstone occurs with only one exception, where a vein of red granite crossed from W. to E. between these two latter places. I observed occasionally stones of a yellowish grey colour, spotted with black points, resembling those which are thrown up by Vesuvius during its eruptions. I also found abundance of fragments of hard sandstone, containing quartzose pebbles, which were in patches, and at no great distance from each other. The patches of stones of a grey colour, which appeared volcanic, were at least 40 or 50 miles from the hills; and though they appeared to have been deposited after some volcanic convulsion, we were unable to discover any extinct volcano; the sand does not drift much in this desert. I also occasionally found hard black cinders. It is, however, remarkable that these isolated patches are found at so great a distance from the mountains. At 8 hours S. of Ambukol we came upon patches where water had collected during the periodical rains; and upon looking at the map I observed that Mr. Arrowsmith had laid down their northern limits very correctly.

The desert of Bayúdah abounds in herbaceous plants, and one or two varieties of the mimosa. It also possesses many objects of great interest in the zoological kingdom, especially the leopard, oryx, and gazelle. Its few inhabitants belong to the tribe of Kabábísh Arabs.*

In 2 hours and 40 minutes we halted for the night at Jagjoke.

Feb. 1. We travelled 8 hours and 40 minutes to Kerrerí. On the following day, in 4 hours, we arrived at the northern point of the White Nile (Níl el Abyad), on which we embarked, and in less than an hour arrived at Khartúm.

The direction from Ambukol to El Hajír was from N.W. to S.E., and the distance occupied us 52 hours' march, which, at 2½ miles per hour, would give us 130 miles; from El Hajír to Khartúm, from N. to S., following the course of the river, 16 hours 20 minutes, or about 42 miles.

The position of the junction of the Bahr el Abyad, or White River, with the Bahr-el-Azrak, or Blue River, in the observations given me by M. Linant, is 15° 34′ 40″ N., and 32° 11′ 25″ E. of Gr. These observations do not agree with those already made by the same gentleman, and published in a memoir on the Bahr el Abyad, in the second volume of the London Geographical

* Plural of Kabbásh, "a shepherd."—F.S.

Journal; for M. Linant there gives the position of the junction of the two rivers as 15° 34′ N. lat., and 32° 30′ 58″ E. long.* Mr. Perring, a civil engineer in the employment of Mohammed 'Alí Páshá, who kindly undertook the construction of my map, pointed out the discrepancy between these observations; and we immediately saw M. Linant on the subject, when he told us that he considered the list furnished to me, from which I took all the fixed points, to be the most deserving of reliance, because he carefully looked over and corrected his observations after his return to Caïro, and subsequently to his sending his papers to the African Association.

Khartúm (the Proboscis) is situated on the W. bank of the Blue River, about 1½ mile from its junction with the Bahr el Abyad. It is the seat of government of the Beled-es-súdán, and the present governor is Khúrshíd Páshá. It was a small village when Mohammed 'Alí subdued the kingdom, but has risen rapidly into importance at the expense of Shendí and Sennár, and is now a place of considerable trade, being convenient as a rendezvous for the slave-caravans from Abyssinia, Sennár, and Kordofán. It contains 15,000 inhabitants, including about 1600 soldiers and their families. Parts of it are regularly built. Many of the houses are large and isolated, enclosed by a garden. They, as well as Khúrshíd Páshá's palace, which is by no means striking, are built of sun-burnt bricks. The bázárs are irregular, small, and confined, and, when the troops are absent, extremely ill-supplied. The principal articles of consumption are shoes, calicoes, printed goods, sugar, rice, broad cloth, pistol-belts, saddles, worked saddle-cloths, a little tea, crockery, hardware, *mishmish,*† *kamar-ad-dín,*‡ &c., and a considerable trade in slaves is carried on both by auction and private contract. Just outside the bázár is the market for vegetables, bread, fruit, sugar-cane, butter, dates, grain, straw, grease for the head, &c. &c. And here stands the frame to which criminals are suspended when executed, complete with rings and accommodation for three persons.

The land upon which Khartúm is built, as well as that which surrounds the town, is rich alluvial soil, similar to the deposit of the Nile. The ground is flat and without trees. The banks of the river at the season of low water are about 30 feet in height, and I should think, from their appearance, that the average rise of the river here is about 20 feet. During this, my first stay, at Khartúm, the mercury in the thermometer never stood in the daytime below 75°, but on the 10th of February it rose to 90°.

Feb. 11. I left Khartúm to proceed up the Blue River, Khúrshíd Páshá having provided me with an excellent boat

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* Vol. ii. p. 171.—Long. 32° 41′ is adopted in the map from Bruce's observations at Halfayeh.

† Dried apricots.

‡ The pulp of apricots spread out and dried.

for that purpose, and on the 15th I arrived at Abú Kharráz, on the E. bank, and at the júnction of the Rahad, an eastern tributary stream about half a mile wide, of blue water and rapid current. Here is a village of considerable size, and a station of 300 Moghrebí cavalry. Most of the houses are of straw, of a circular form, and resembling corn-stacks. There are only one or two, of sun-burnt brick, and the largest of these is that of the káshif. There is a market here daily; the wares are scanty, in small quantity, and of inferior quality. On the same day I crossed the river to Wád Medínah, and in an hour reached a military post, where one battalion of 800 men is stationed. Here is a daily market, small, and ill supplied with articles of a very coarse description.

There are two large bázárs held in the neighbourhood of Wád Medínah weekly; that to the northward is at Sálemíyah, the other, to the S.W., at Sorríbah. To the latter I went on the 16th. The village is situated about 6 miles from the river, and the road to it is over a rich plain. Dhurrah (millet or sorghum) is cultivated round it in patches after the kharíf or rainy season is over, but for want of capital and labour by far the greater proportion of the soil lies idle. This market was well attended, principally by Bedowíns, and the wares exposed for sale much better than those at Abú Kharráz and Wád Medínah. The banks of the river at Wád Medínah are about the same height as those of Khartúm, and I should think that the rise of the Nile is in the same proportion. Thermometer at Wád Medínah, Feb. 16, 88°.

On the 17th I left Wád Medínah, and at 4 P.M., on the 21st, I had moored my boat immediately below Sennár. I took up my quarters in a house in the barracks, provided for me by the military commandant; and I was hardly settled in my new habitation before the peasantry flocked in numbers with their manufactures to endeavour to seduce me into becoming a purchaser. Among their wares were mats with beautiful devices made of split dóm (Cucifera Thebaïca) leaves, and dyed of various colours, conical straw covers for plates in elegant patterns, silver zerfs (stands for coffee-cups) in filagree, warlike weapons, spears, knives, &c., and lastly, hegabart, or amulets for security from every kind of disease and casualty, including the fatal fever of the country and the voracious jaws of the crocodile.

A small bázár is held daily at Sennár, and the principal articles for sale are butcher's meat, grease, oil, tobacco, dhurrah, bilbil, and merísah;* but on Mondays and Thursdays a market attended by persons for many miles round is held at Kadero, a village to the S. of Sennár, about 1½ mile from it, and between it and Jebel Mowíl. That held on Mondays is the largest and best supplied. Near the place where the daily bázár of Sennár is held is a mosque,

* Bilbil and merísah are kinds of beer made from fermented dhurrah.

adjoining to which may be traced the foundations of the palace (now no longer existing) of the last sultán, and near it is a coffee-house, the favourite resort of the military officers and fashionables of this capital.

The banks of the river at Sennár are between 40 and 50 feet high. The Nile rises about 20 feet. The country around is dull, uninteresting, and flat, with the exception of Jebel Mowíl, a hill about 800 feet high, six miles S.W. by S. of the town. Scarcely a tree is to be seen except in the distance towards the S. To the N., S., and E., are villages about 2½ miles off.

The inhabitants of Sennár are of a dark-brown colour. The women are lighter than the men, and both are handsome. The latter wear drawers and a cotton shirt reaching to their ankles, or a fold of cotton round the waist, and afterwards thrown loosely over the shoulder. Most of them wear rosaries of black seeds, of ebony, or other wooden beads, round their necks. They almost all have a purse suspended from the neck, hegabart, or amulets, on the right arm above the elbow, and a knife on the left in the same situation. Some wear leather ornaments round the ankles. They generally allow their hair to grow, and do not wear the Táḳiyeh, or white skull-cap.

The women wear a fold of cotton round their bodies, thrown afterwards over the shoulders, and sometimes covering the head also. The unmarried girls and slaves usually wear only a ráhat, or leather fringe, round the waist. Their hair is plaited into tresses about the thickness of rats' tails; and this operation of plaiting is preceded by the destruction of the parasites which abound in these localities; a massacre which they carry on against those insects every fortnight or three weeks. The head is then dressed, and loaded with three or four pounds of mutton-suet or camels' fat. Some of the women wear silver ear-rings; all, necklaces of glass beads; and most of them an immense bunch of hegabart suspended from the neck. They also ornament themselves with bracelets of silver, of rings of horn or ivory, plain or slightly adorned with black spots; leather ornaments on the wrists and ankles; and I noticed a few who had a ring or beads passed through a perforation in the right nostril; but this was by no means common. Both men and women have good teeth. In many the gums are black or brown, deriving this peculiarity from their admixture with the negroes. Many of the women allow the nails on the fingers of the left hand to grow to an extraordinary length, an inch or more beyond the tip of the finger, similar to the women and grandees in China. They, however, pare the nails of the right hand, as the not doing so would interfere, they said, with their custom of eating with their fingers. Most of the lower orders possess one or two slaves.

The neighbourhood of Sennár is interesting to the naturalist. A very great variety of animals and birds are to be found during the kharíf or rainy season, and when the dhurrah is ripe. At all times the crested crane abounds, as well as several other species of cranes, storks, eagles, and vultures. I observed great numbers of wild guinea-fowls, and many varieties of ducks and geese. Elephants, hippopotami, and crocodiles are in great abundance.

During my stay at Sennár the thermometer never stood lower than 88°; and on the 27th and 28th of February it rose to 94°.

March 2.—At 5 A.M. I took my departure from Sennár by the Nile; at 10 A.M., on the 5th, I arrived again at Wád Medínah; and in the afternoon of the 9th I left it in order to proceed to Monkarah, near Wád Shellaï, on the White Nile. In 1 hour and 40 minutes from Wád Medínah we reached the village of El Bessátnér, and in 1 hour and 10 minutes more we arrived at El Leïweh, where we rested for the night.

March 10.—In 2 hours to Heglígah, and in 3 hours more to Abút. This tract is a dead level, with a soil of the richest quality; but from want of capital, and paucity of inhabitants, little of it is cultivated, and that only during the rainy season. The peasantry are content to raise a crop of dhurrah sufficient to answer the demands of the government, and to maintain themselves during the year. The water of Abút is good and wholesome. Thermometer 90°.

March 11.—In 5 hours we arrived at Monákil, and took a meal of sour milk, pastry, and honey, with a Turkish soldier, káïm-makám, or governor of the village. A market, held here every Sunday, is better attended than any other in the neighbourhood. The water of Monákil is slightly impregnated with iron, but by no means unpalatable. In 5 hours from hence we arrived at the small village of El Fákirkír; ½ a mile from which are wells of good water. Our journey to-day was 10 hours.

March 12.—In 1 hour and 20 minutes from El Fákirkír we arrived at the wells of Emm-dakkat, where the water is slightly brackish, though not so much so as to be despised. 3¾ hours more brought us to Egarín, a village consisting of several huts, but only three inhabited. The water here also is brackish. We left Egarín in the evening, and, after travelling 5 hours, halted for the night.

March 13.—I resumed my journey at an early hour, and in 6 hours 15 minutes arrived at Monkárah, with the thermometer at 93°. Our general direction, from Wád Medínah to Monkárah, was W., and the distance 86 miles. The price we paid for each of our camels, 12½ piastres [2*s.* 6*d.*].

From Abút to Monákil the country is not cultivated; but I am of opinion that in proper hands it might be made available

for agricultural purposes. From Monákil to Monkárah the land is of excellent quality, with the exception of a small strip, about 7 miles distance from the latter place. After having made several excursions into this desert, and crossed from Wád Medínah to Monkárah, I have come to the conclusion, with respect to the country from Jebel Mowíl, near Sennár, to Al-leïs, westward, and to Khartúm northward, that the greatest portion, if not the whole, of this triangle, is formed by the alluvial deposit of the Nile. The soil of this desert—if desert it may be called—is precisely similar to that near the banks of the river; its surface is nearly a dead level; there are no hills or mountains; and the Nile, even now, rises during its increase to within 2 or 3 feet of the top of its banks, on the Blue and White Rivers; and in many parts of the latter, where no banks exist, it spreads itself over a large tract of country. If a canal were cut from Wád Medínah to Monkárah, with branches N. and S., almost all the land might be used for the production of cotton, indigo, tobacco, sugar, grain, &c. Much might be accomplished by means of tanks for collecting the rain-water during the kharíf, and by sinking wells. But still this would not suffice to irrigate the whole of this rich and valuable land. Between Wád Medínah and Monkárah the country is beautifully studded with prickly acacias. Monkárah is one of the Páshá's boat-building stations. There is abundance of wood in the neighbourhood; but little of it is used, as larger and better timber is found near Al-leïs, or in the country of the Shillúks. About thirty boats are built here annually. I observed eighteen or twenty pairs of sawyers, and five or six boats on the stocks. The sawyers are negro slaves and convicts. The whole population may be 100 persons.

In travelling in this country it is absolutely necessary to prevent the skin being exposed to the scorching rays of the sun, or it is immediately attacked with swelling and inflammation. Between Abút and Monkárah I was so imprudent as to ride with my legs bare from the knees downward, and when I arrived at the latter village they were so swollen, painful, and inflamed, that I was confined to my bed several days before I was able to proceed to Kordofán.

On the morning of the 15th I crossed over from Monkárah to Kajebí, a small settlement of Hasaníyeh Arabs, on the W. bank of the Nile, and N.W. of the former place. Here were also the tents of Suleïmán Káschif, who was collecting the contributions from the villages in the neighbourhood. During my stay at Kajebí a party of Shillúks arrived, accompanied by the son of their sultán. This prince was dressed in a blue cotton shirt, similar to those worn by the felláhs (labourers) in Egypt. They were on their way to Khartúm, for the purpose of endeavouring to make terms of peace with Khúrshíd Páshá, and adding their dominions to

those already subject to the Viceroy of Egypt; a policy they thought it better to adopt than to expose themselves to the annual or biennial incursions of his troops for the purpose of seizing them as slaves. I heard that, subsequently to my leaving the Beléd-es-Súdán, Khúrshíd Páshá had concluded treaties with them, and that they are now subject to Mohammed 'Alí. These Shillúks were fine men; none of them less than six feet high, and many of them several inches taller. They were clumsily formed, their legs being too short for the size of the trunk. The heads of some were shaved: the hair of those unshorn was curled and woolly. Their countenances were harsh and savage, their cheek-bones high, and noses narrow near the root, but broad and flattened towards the nostrils. Like the inhabitants of Denkah, the incisors of their lower jaw had been extracted. The only weapons they had with them were sticks, shields, and spears of a rude construction. Some of them wore a single ring of ivory above the elbow of the right arm. Their prince was distinguished from the others by two large rings of solid silver, which he wore as bracelets on his left wrist. They indulge in smoking, but not to excess. They amused us one evening with several choruses and catches, which they sang in a very pleasing manner, keeping excellent time. They are very expert sportsmen, killing the crocodile and hippopotamus with the same spears which they use in self-defence. At Kajebí, in a double tent, the thermometer reached 112° on the 19th March.

The west bank of the White River is occupied to the N. and S. of Kajebí by Hasaníyeh Arabs, whose only other settlement which I observed was opposite Berber. They are generally fine men, a shade lighter than the Sennárese; and their females not so dark as the males. They are social, lively, and gay, and their females particularly fond of their national dance, which they accompany by clapping of hands and singing.

March 22.—At ½ past 7 A.M., having procured camels at 25 piastres each, I left Kajebí to proceed to Kordofán, by the desert of Habshábeh. Our guide lost his way and took us in a S.W. direction to Túrah, where we arrived in 6½ hours. The track is over land some portions only of which are tilled; much more might be brought into cultivation, though not all, for some of it is light and too sandy. I noticed the impressions of hippopotami in several places, the first I had seen: they were as much as two miles distant from the present channel, though at the height of the inundation the river passes through temporary channels close to the place where I observed the foot-marks, and there is little doubt but that the animals had been basking in some of these shallow streams which at this season of the year are dry. Túrah is a village consisting of a few circular straw huts; there is good water in four

wells. In the evening I left Túrah, our direction due W., to Abú ghárát, where we halted for the night. The distance travelled to-day 8 hours 40 minutes.

The next morning a caravan arrived at Abú ghárát, and I soon ascertained that it was that of Abú Medyán, half-brother to the present Sultán of Dár Fúr, who was on his way to Khartúm, intending, with Khúrshíd Páshá's permission, to go to Cairo to endeavour to persuade Mohammed 'Alí to furnish him with troops to proceed against his brother, and, if possible, make Dár Fúr tributary to the Egyptian viceroy. A gentleman at Khartúm had given me a letter of introduction to this sable prince, and I lost no time in presenting myself at his díván. I found him about 25 years of age, of the most complete jet black, with a countenance frank, ingenuous, and pleasing, and features partaking little of those characteristic of the negro; in stature, short and inclined to corpulency. From him I learnt that the present Sultán would detain all Europeans who should enter his kingdom, as prisoners—under the impression that they had visited it to make surveys with the idea of returning to Europe and bringing an army to subdue and overthrow him: that such prisoners he would treat with courtesy, furnish them with a house, good provisions, horses, slaves, a harem, &c., but that a guard would always be stationed at the door, and the state-prisoners would never be allowed even to ride or walk out unless accompanied by an escort. The Sultán resides at El Fásher, which is called also Tendeltí; he has an army equipped with swords, spears, and shields: firearms are unknown amongst them. The inhabitants of Dár Fúr, as well as Dár Márah, to the S. of it, are Mohammedans.

Abú Medyán informed me that the distance from El-'Obeïd, the capital of Kordofán, to El Fásher, was 13 days of camel-journeys. From Kobbeh to Kubkabíyah 3 days, and from Kobbeh to Debbah, nearly opposite to Old Donkolah, 25 days.

In the evening I resumed my journey in a S.W. direction, and in 3 hours arrived at El 'Adáyír. The water at Abú-ghárát is good, while that at El 'Adáyír is brackish. This latter village is situated on the edge of an uninhabited waste, and, as it was a bright moonlight night, I determined to enter it immediately. In 1 hour and 50 minutes we were obliged to stop, as the Ḥájí was taken suddenly ill. Our journey to-day was 4 hours 50 minutes. Thermometer 96°.

March 24.—I set off early, and in 5½ hours arrived at a single isolated tree, the only one between El 'Adáyír and Habsháḅeh. In 2½ hours from this spot we passed Jebel esh-shawáyír, a hill about 250 feet high, a little to the left of our route; and 4¾ hours beyond halted for the night, after having travelled this day 12 hours 30 minutes.

March 25.—Started at ½ past 6 A.M., and in 3½ hours arrived at the village of El Habshábeh. In passing this 'Akabah or desert-ascent, it is necessary to carry water, as none can be procured between El 'Adáyír and El Habshábeh. Before leaving Monkarah or Kajebí, the traveller should see that each camel is provided with two water-skins to be filled at the wells of Abú-ghárát, in preference to those at El 'Adáyír. The camel-drivers will provide the skins, and suspend one on each side of each camel under the baggage. The water at El Habshábeh is good and plentiful. The desert between it and El 'Adáyír is uninhabited; but we observed occasionally Kabábísh Arabs pasturing their camels upon a plant to which they give the name of Askanít,* and which the camels eat with avidity. The plants are covered with fine thorns, which readily enter the skin and give great inconvenience and annoyance to the traveller.

In the evening we travelled 3¼ hours before stopping for the night. The distance to-day 6 hours 40 minutes. Therm. 99°.

March 26.—In 8 hours from our resting-place we reached El Kowermát, the water of which is good. Here I met with two pilgrims from Bornú, who were on their way to Mekka. They had come by way of Dár Fúr and Kordofán, and had already been twelve months on their journey. They had a very vague idea of their country, and all the information I could obtain from them was that it was situated upon a river called Shárí, which they believed to be one of the tributary streams of the White River, and that the name of their present Sultán is Mohammed.

Between El Habshábeh and Kowermát innumerable trees are decayed and laid prostrate, the work of those destructive insects the white ants, which abound in this desert. The soil between these two places is light and sandy; and very little is at present under cultivation. Encamped for the night after a day's journey of 12 hours 20 minutes. Thermometer 103°.

March 27.—In 50 minutes we arrived at Ed-du'amá, and, our camels and asses being fatigued, stopped here for the day: between El Kowermát and Ed-du'amá the soil is sandy, and few patches of it are capable of cultivation. The only grain produced is dhukhn (sorghum), which appears to thrive well on a light sandy soil. The inhabitants of all these villages are almost wholly uneducated, and have very primitive ideas. A boy asked me at Ed-du'amá how many days there were in an hour?

In the afternoon I left Ed-du'amá, and after 4 hours and 20 minutes stopped for the night. Thermometer 104°.

March 28.—We started this morning early, and in 4 hours arrived at Wád Desakkí [Dhá-s-sákiyeh?]. After having killed a lamb which I procured in the village, I observed that our

* Pennisatum dichotomum?—F. S.

camel-drivers, who were Hasaníyeh Arabs, ate the tripe and intestines raw; and, upon inquiring if such was the custom of these Arabs, they said that they never eat those delicacies otherwise. From Ed-du'amá to Wád Dhá-s-sákiyeh much dhukhn is produced. The soil is light and sandy.

In the neighbourhood of Wád Dhá-s-sákiyeh iron ore, yielding 25 per cent. of metal, exists in considerable quantities. It is found within from 3 to 6 feet of the surface; and the metal is extracted by placing the ore in a heap with wood and charcoal, and covering it with sand: the fire is then kindled, and by means of bellows a white heat is produced, and the iron runs off. The inhabitants work the ore at their own expense, and make the hasshahshah, or iron money of El-'Obeïd, and send also presents of the metal to the shipbuilding station at Monkarah.

The water from the wells of Wád Dhá-s-sákíyeh is good. I left the village late in the afternoon, and proceeded on my journey for 4 hours, when I rested for the night. Our distance to-day 8 hours: thermometer 101°.

March 29.—In ½ hour we arrived at Korsí. The soil between it and Wád Dhá-s-sákiyeh is sandy, and annually produces a considerable quantity of dhukhn. Korsí is the largest village between the White River and El-'Obeïd, and contains about 500 inhabitants. A Káschif resides here; a sheïkh, a military commandant, and a few troops. A market is held daily, but poorly attended: on Mondays and Thursdays are the best markets, and these are frequented by the Bedowíns and Arabs from the neighbouring villages. The water from the wells is good and abundant. In the afternoon I left Korsí, and after travelling 6 hours and 20 minutes halted in the desert. It is necessary to carry water from Korsí to El-'Obeïd, as there are no wells on the road, the villages being at some distance from the caravan track: thermometer 99°.

March 30.—We continued our march early this morning, and in 3½ hours arrived at El-'Obeïd. The road from Korsí for the first 4 hours is over sand; afterwards the soil is firmer; and, lastly, the sand appears again on approaching El-'Obeïd. Our general direction from El 'Adáyír was S.W., and the distance from Kajebí 180 miles; from Korbáj, a village about 2 miles to the eastward, the descent is very gradual to El-'Obeïd; a little to the N. of the village we passed an isolated hill, about 150 feet high, called Jebel Korbáj.

El-'Obeïd, vulgarly pronounced L'Obeyet, the capital of Kordofán, is situated in a plain: it contains 30,000 inhabitants, having increased 15,000 since 1828. The town is straggling, extending about 2 miles from N. to S., and 1 mile from E. to W. The houses are principally built of dhukhn reeds or straw, in the form

of English corn-stacks, and two or three of these houses frequently belong to the same family, and stand within a small enclosure. The house of the governor Mohammed Bey, of Selím Káschif, of the military commandant, and of the Europeans in the service of the Páshá, with one or two more, are built of sun-burnt bricks.

The inhabitants of Kordofán belong to several tribes. The most numerous, called Gúnjárah, consists of adherents of Sultán Fadl; the second is called Meserbát, and were subject to Háshim, formerly Sultán of Kordofán; the third, El Fúng, belonging to Sultán Idrís Ibn 'A'dlám, called also Fúngaráwí, probably originally from Jebel Funjí; and the fourth, Iddellaglí, is a tribe of Donkolah. The Meserbát is the tribe properly belonging to Kordofán. In choosing a wife a man is not obliged to marry a woman of Kordofán, and *vice versâ.* In many Arab tribes, if a man marries a woman of another tribe and loses his wife, he is not afterwards allowed to marry one of his own tribe. The tribe of Aulád Seïd, for example, which inhabits Jebel Tór, in the peninsula of Mount Sinaï, does not permit a man who has once married out of his tribe to take a wife from it afterwards: but in Kordofán, if a man of Gúnjárah marries a woman of the Meserbát, and either divorces her or loses her by death, he can marry into the tribe to which he himself belongs, or into any other, as he chooses. Kordofán has been subject to Mohammed 'Alí Páshá about sixteen years. Before he obtained possession of it, it was a province of Dár-Fúr; and when subdued by the Defterdár Bey was governed by Towáshí Emm-sellam, a black eunuch, who, with the assistance of Ibráhím Idwír, a sultán of Dár-Fúr, maintained a contest against the Turks for an hour, when, both he and the sultán being killed, his people gave way, and submitted to the government of the viceroy of Egypt

A market is held every afternoon at 4 o'clock, where provisions of the most ordinary kind are offered for sale, principally the produce of the country. Grease, for anointing the hair and skin, is in the greatest demand; and in April and May, just before the periodical rains, good water fetches a high price: for, with the exception of the well attached to the governor's house, and one or two others in the town, all the water obtained from the public wells is so brackish as to be unpalatable even to the natives of the place. The Páshá's money, Spanish dollars, and English gold, are current in the bázár; but as every article of life is so remarkably cheap, and small change very scarce, the peasantry in Kordofán make an iron money from the ore obtained from the neighbourhood of Wád Dhá-s-sákiyeh, and to which they have given the name of Hassháshah. This money resembles a section of a mushroom, is made without any reference to weight, and each piece passes for one párah, forty being equal to one Turkish

piastre, which, according to the present rate of exchange, is equal to about $2\frac{1}{2}d.$ sterling. All money transactions are made in reals, an imaginary coin, equal in value to 15 piastres.

The troops stationed in Kordofán were marched annually after the kharíf to Jebel Núbah, for the purpose of capturing slaves from these mountains. These expeditions were called Ghazíyeh,* and when I arrived at El-'Obeïd the troops had just returned with the produce of such an expedition. The handsome women were sold for the harems of the Turks and Arabs; the able-bodied men were placed in the ranks; the decrepit of both sexes, the pregnant females, and young children, were allotted to the soldiers in lieu of money to the amount of a moiety of their arrears. I once witnessed this distribution; and a more heart-rending scene cannot be imagined: for, though these blacks had been seized two or three months, and had been deprived of their liberty, they felt severely the final separation from their friends and families. As the soldiers were many months in arrear, they were obliged to receive the slaves considerably above their value, and sell them again at a great sacrifice; and many were compelled to turn their slaves into money, in order to relieve their immediate embarrassments. A slave, therefore, who had been received by two soldiers in lieu of 300 piastres, was sold in the bázár for little more than half that sum; and many were daily hawked about and disposed of by public auction.

The slaves are of various prices, a child 4 or 5 years old is worth 50 or 60 piastres (10*s.* or 12*s.*); an adult sells from 4*l.* to 6*l.* Beautiful Dár-fúwí girls are in great request; and an unexceptionable looking one will fetch from 15*l.* to 20*l.* Abyssinian women are much in demand, and sell from 10*l.* to 20*l.* a-head. But, for domestic purposes, slaves from Dár-fúr are preferred.

Up to the period of my visiting Kordofán, the bodies of negroes and criminals were never interred, but thrown outside the town to be devoured by birds and beasts of prey. When Moḥammed Bey succeeded Muṣtafá Bey as governor, one of his first orders was to collect and burn all the human bones in the vicinity of El-'Obeïd, and to direct that slaves, in future, should be interred according to the Moḥammedan rites of sepulture.

But the most distressing circumstance resulting from the slave trade, and one more than any other calculated to excite our sympathy, is the system of emasculation carried on at El-'Obeïd. This

* It is gratifying to add that, owing to representations I made to Dr. Bowring, when he was in Egypt, he succeeded in obtaining a promise from Moḥammed 'Alí Páshá to abolish the Ghazíyehs in the Beléd-es-Súdán, to discontinue paying the troops in slaves, and to punish slave-dealing amongst the soldiers. And there seems reason to believe, from what I have since heard, that his orders have been carried into effect.

operation is principally performed by Melik Tamar, brother to the late Sultán of Dár-fúr. He belongs to the tribe of Gúnjárah, which tribe is remarkable for having black nails, caused by the natural deposit of the *rete mucosum.* For many years he enjoyed an exclusive monopoly of this brutal practice, but, as his success was great, other persons, finding they could realize a larger profit by making their captives eunuchs than by selling them as ordinary slaves, adopted a similar profession. As Sultán Tamar is a man of considerable celebrity, I visited him; I found him infirm, about seventy years of age, with a haggard countenance, of a jet black hue, and having a scanty white beard, which he had dyed red with hinná (Lawsonia inermis). When he spoke he held his hand before his mouth, anxiously concealing his nearly toothless jaws. He said that he first came to Kordofán 36 years ago, and remained there till the Defterdár subdued it, when he returned to Dár-fúr, but, having received a hint that his presence was not agreeable, and fearing assassination, he removed to Sennár, and when the new government was finally arranged returned to El-'Obeïd, where he now enjoys a pension of 600 piastres (6*l.*) a-month from Mohammed 'Alí Páshá. He emasculates from 100 to 150 slaves annually, and the same number are mutilated by the other operators in Kordofán. Sultán Tamar is always in difficulties, and (which is remarkable) he is very charitable, keeps open house, and his consumption of grain amounts to about 500 ardebs (2500 bushels) a-year. He inhabits a curiously-arranged straw-built house, and possesses 200 slaves. His slaves, whenever they bring him water or sherbet, fall upon their knees, present the cup, and do not rise again till they have left their mighty master's presence. The subjects selected for emasculation are boys from 7 to 11 years old. All the organs are removed,* and the operation rarely proves fatal, not more than 5 per cent. There is a military hospital at Kordofán; a powder-magazine enclosed in a fortification of mud walls, upon which are mounted two pieces of cannon; a mosque recently erected; and about a mile to the east of the Governor's house is a large water-tank, made by Rostan Bey when he was governor, on the edge of which he built a summer residence, now in ruins, where he passed much of his time in the society of his women.

The men of El-'Obeïd are well made, spare, and tall. Their features are handsome, and their skin of a dark-brown colour. Their hair is slightly curled, and they generally wear it long and plaited. Their dress consists only of a piece of cotton cloth over the pubis, with a cord round the hips to keep it in its place, or of

* The Arabs have a peculiar term for this complete mode of castration: former observers however have found the mortality in such cases to be very great.—F. S.

a cotton shirt and drawers. Some wear the tákíyeh, and a very few the tarbúsh and turban: many have *hegabart* above the elbow on the right arm; and almost all carry a knife upon the left, and frequently a pair of tweezers are thrust into the sheath of the knife, which the peasants use in removing the thorns of the askanít.

The women are generally very beautiful, and are a shade or two lighter than the men. They wear their hair long, plaited, and loaded with grease. Their dress consists of a piece of cotton cloth round the waist, generally passed over the shoulders; many of them wear silver ornaments round their necks, bracelets, earrings of a tremendous size, ponderous nose-rings, and ornaments for the ankles. Some have a few beads of gold, mixed with glass or other beads, round their necks; and those who cannot afford ornaments of gold or silver wear them of horn, leather, wood, or iron.

The female slaves and girls wear the ráhat or leather fringe round the waist, sometimes ornamented with cornelians and silver balls. The children of both sexes generally go naked till the age of 6 or 8 years.

Throughout the Beled-es-Súdán, but more in Kordofán than in any other part of it which I visited, many of the men, and almost all the women, have three or four perpendicular gashes on each cheek. This disfigurement is considered by them as a great beauty. I observed, also, some of the women cut on the temples, shoulders, fore-arms, breasts, and back, on one and sometimes on all these parts. This operation is performed with a razor, and the parts cut are then rubbed with wheaten flour and water to prevent the edges of the skin from uniting, and to cause the parts to heal by granulation; for the higher the skin is raised after this process, the more beautiful is the effect produced. Both sexes perfume themselves once or twice every month. The women are fond of dancing, and perform on the darabúkah or drum. The men amuse themselves with playing on the zomárah or flute, made of a reed; while both sexes perform on the harebábah, or lyre of five strings.

The diet of these people is simple: their fare consists of dhukhn, a grain which grows well on a sandy soil, made into porridge or bread; bámiyah, a mucilaginous vegetable,* sour milk, and the seed of the askanít, a plant abounding in the desert, but occasioning a violent diarrhœa to those who are unaccustomed to eat it. They also drink arrack,† a spirit distilled from dates,

* Okra of the West Indians: the *Hibiscus esculentus*, "le plus glutineux des légumes," says M. Olivier.—F. S.

† Arakí. The word here used is a Greek word adopted by the Turks.—F. S.

bilbil, and merísah. The women are more frugal in their diet than the men, and rarely eat animal food.

The prevailing diseases are fever, dysentery, and small-pox, the latter being very destructive. The plague is unknown here, and ophthalmia a disease of very rare occurrence. Senna (*Cassia Senna*) is indigenous and very abundant in Kordofán. Round the town there are twenty or twenty-five very large trees, called Tebeldír or Hamrá: I have no doubt they are the monkey-bread (*Adansonia digitata*), as they bear a fruit of an oval form, something like the vegetable marrow, and when dried, the natives eat the inner substance, which is white and farinaceous, surrounding irregularly-formed brown seeds. The flavour of this fruit is a pleasant acid. I measured the circumference of one of these trees at the base, and found it to be 48 feet. White ants (termites) abound at El 'Obeïd, and commit great devastation. There are a few dogs which belong to nobody, but not so many as at Khartúm and Sennár: hyænas are frequently seen in the neighbourhood. Within a few days' journey from El 'Obeïd the camelopard is found, and Mustafá Bey had procured six the year before I was there, but from want of proper management all but one had died. There is a beautiful variety of the goat at Kordofán: it is not indigenous, but was originally brought from Jebel Núbah, where it is wild, but when taken is easily domesticated: the same species is found in Jebel Fungí, to the south of Sennár.

The exports, with the exception of slaves, are entirely monopolised by the government: they consist of gold, silver, hides, ivory, and gum Arabic. Slaves are allowed to be exported from Kordofán on the payment of a heavy duty.

On the 14th of April Mr. Rusegger, a German mineralogist, employed by Mohammed 'Alí, arrived at El 'Obeïd on his way to Shabún to inspect the gold-mines.

Seven miles to the S.E. of El 'Obeïd is the village of Milbess, beautifully situated, and the summer residence of the principal persons in authority. The land here is rich and productive; good water is found in shallow wells, of which the inhabitants avail themselves for artificial irrigation, raising it by manual labour. Half a mile to the W. of Milbess are some hills about 140 feet high, the formation of which is primitive quartz, and from the summit of any of them there is an extensive view of the desert, and of Jebel Daïr,* about 25 miles to the S., a small chain of mountains which, though only one day's journey from El 'Obeïd, is not yet subject to Mohammed 'Alí Páshá, and is the favourite resort of slaves who have absconded from the capital.

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* The Dyre and Tuggala Mountains of Bruce.—F. S.

Six or seven days' journey to the S.W. of El 'Obeïd is Jebel Núbah, whence the Páshá used to carry off slaves annually. The inhabitants of this chain are, generally speaking, handsome, and, if they are not frequently sold from hand to hand, turn out good and faithful domestics. They are dark, though not black, with much less of the negro feature than the Shillúks, Denkáwís, or inhabitants of Dár-fúr. I observed many of the women from Jebel Núbah with perforations in their ears and chin, into which small pieces of wood had been introduced; and the females of Jebel Minmin, an offset of Jebel Núbah, extract the incisors of the lower jaw, a practice adopted by the Shillúks and people of Denkah: the men do not observe the same custom. The Núbáwís salute each other with the two first fingers of the right hand, snapping them twice with those of their friend. The thermometer ranged from 90° to 97° Fahr. at 2 P.M. in the shade during my stay at El' Obeïd.

April 15.—After sixteen days spent at El 'Obeïd I quitted it at half-past 4 P.M. on my return to Korsí, and arrived there at a quarter to 7 A.M., on the 16th, having rested only 1½ hour on the road during the night. Having determined to proceed by the desert of Sakrah, I took a guide from hence to the village of that name. In 2 hours from Korsí I arrived at Umm-hájir, and was obliged to stop, as the Hájí was suffering from bruises which he had received in a fall from his dromedary on our leaving Korsí. The people of Umm-hájir were kind, willing, and obliging: they gave me, immediately upon my arrival, the best house in the village, and provided me without delay with a kid, fowls, milk, straw, dhukhn-bread, &c.

April 17.—I left Umm-hájir at 10 minutes to 5 P.M. In 1 hour we arrived at the village of Rokab Ardam; in 1 hour 30 minutes at Gamrah Hamdasíd; in 50 minutes, after passing El Fásher, we reached Wád Berrí; and in 2 hours 5 minutes from thence we arrived at Umm-bálaghí, where we rested for the night. Here we found comfortable quarters and procured provisions without difficulty as soon as the inhabitants perceived that it was my intention to pay for everything I required. The soil from Korsí to Umm-bálaghí is very light and sandy: it is adapted for dhukhn, and a great deal is grown. After leaving Korsí the best water is found at Umm-hájir and Rokab Ardam. In all the other villages the water is brackish, and it is slightly so at Umm-bálaghí: our journey to-day was 5 hours 35 minutes.

April 18.—At 5 P.M. we left Umm-bálaghí and in 1 hour arrived at El Kaú; here iron-ore is found close to the surface of the ground, and is excavated and wrought for the government. Two hours farther we passed El Margler, a populous village for this part of the country, where I observed a schoolmaster teach-

ing twenty or thirty boys by the light of an enormous wood-fire. One hour beyond we arrived at 'Abd-al'ír, where we halted, having found a comfortable straw hut, and without difficulty obtained everything in the way of provisions, &c., I required. Good water is found at all three of these villages: thermometer 96°. Our journey to-day 4 hours: for the last two days we travelled slowly, in consequence of the indisposition of the Ḥájí.

April 19.—At 4 hours and 20 minutes P.M. we left 'Abd-al'ír, and in 1 hour we passed Aúlád Marghah; 2 hours thence we reached Asṣereághah; 1 hour beyond El Serreh; and in 3 hours farther we arrived at Umm-ḥájir: its present local governor is Sheikh Bakít, a man of some importance, inasmuch as he commands and collects the revenue of sixteen villages. He is an excellent fellow, ready, obliging, and attentive. He brought us abundance of provisions, and a little dhukhn, though there was a scarcity in the village, the poorer people being obliged to subsist on bread made from the askanít. Good water is found at all these places with the exception of El Serreh, where it is brackish. Our distance to-day 7 hours.

April 20.—Left Umm-ḥájir at 5 P.M., and in 2 hours arrived at Esh-shaṭíb, and in 1 hour from thence at Almána. Thus far Sheïkh Bakít accompanied my caravan to provide a guide to conduct it to Abú Ghárát. My conductor from Korsí was discharged, and a new arrangement was quickly made with the son of the Sheïkh of the village, to pilot us through the desert of Sakrah. During the delay occasioned by coming to terms, the Sheïkh regaled us with fresh milk, sour-milk, and dhukhn-bread: quitting this place, in 3 hours and 20 minutes we arrived at the village of Sákrah. The Sheïkh had retired to rest, but we soon aroused him, and, after a little grumbling, he provided us with comfortable quarters. Our journey to-day, 6 hours and 20 minutes. The water good throughout—thermometer 102°.

April 21.—We left Sakrah at 5 P.M., and, after proceeding 6 hours and 30 minutes, we halted in the desert. It is necessary to take water from Sakrah, as none drinkable is found between it and Abú Ghárát. Thermometer 104°.

April 22.—At 3 A.M. we were *en route,* and in 5 hours and 30 minutes arrived at Bír el Ḥelbah. This well was dug a year ago by the Jowámát Ash-shenít Arabs, a tribe who inhabit a portion of the desert near Wád Dhá-sákiyeh, and who are under the immediate command of Sheïkh Hayásín of Korsí. These Arabs informed Mustafá Bey of their intention of sinking a well, and said that if they succeeded in finding good water, they would settle here, but, after digging to a very considerable depth, though they found water in great abundance, it was so bitter and brackish as to be totally unfit for use. They therefore gave up all idea of

settling at this place. Adjoining the well is a small straw hut built by these Arabs.

Just before we arrived at Bír el Ḥelbah, to the N.W. of the well, and on our left, we passed a small hill named Jebel el Ḥelbah, and to the N.E. of it is a hill somewhat larger, called Jebel el Mináwerát. Each is isolated, and they are the only two hills I observed in this neighbourhood.

At 5 P.M. we resumed our journey, and, after travelling 5½ hours, rested in the desert. Shortly after leaving Bír el Ḥelbah, we met with a great many ostriches and a herd of oryx: the former are found all along this road from Korsí to Abú Ghárát, but especially between the latter place and Sakrah. Our journey to-day was 11 hours. Thermometer 107°.

April 23.—We started again at 4 A.M., and in 5 hours and 45 minutes arrived at Abú Ghárát. I went to my old quarters, the residence of Abdallah the Ḳáïm-makám. He was absent: but his household attended to our wants. I observed in the village a number of women dancing their national dance to the music of the darabúkah, singing and clapping of hands, and, upon inquiry, I found that they were showing this demonstration of feeling out of respect to one recently deceased. I had now passed the two routes from Abú Ghárát to Korsí, the one by the desert of Habshábeh, the other by the desert of Sakrah, and I decidedly give the preference to the latter. In the first place there are abundance of lice which attack the person most furiously on the Habshábeh route—none on the Sakrah. There are more villages and better water on the latter route than on the former. Few caravans pass by the desert of Sakrah, and the inhabitants, from not being plundered by the Turkish and Arab soldiers, are more willing and obliging. The only inconvenience on this route is the greater quantity of askanít, and the annoyance of the thorns on the trees, which in many places overhang the track.

April 24.—At 4 A.M. we left Abú Ghárát, and in 7 hours arrived at the river opposite Monḳárah: we took the road direct between these two places without going round by El 'Adáyir and Túrah. The distance therefore from El 'Obeïd to the White River, opposite Monḳárah, is 67 hours 45 minutes, which, at 2½ miles an hour, gives about 170 miles. The general direction is N.E.

I shall abstain at present from any observations relative to the White River, beyond mentioning that I left Monḳárah on the 25th of April in a boat belonging to the government, arrived at the junction of the Bahr el Abyad with the Bahr el Azrek on the 29th, and on the following morning reached Kharṭúm. During my second visit there were two remarkable hurricanes of wind and sand—the first on the 2nd of May, at 2 P.M., and the

other on the 14th of the same month, at 4 in the afternoon. That on the 2nd commenced more gradually than that on the 14th. In both these hurricanes the wind was from the S.E. On the 2nd, after blowing tremendously for twenty minutes, the atmosphere was of a blood-red colour, succeeded by total darkness: this lasted for a quarter of an hour, when it began to be lighter, and, at the end of two hours from the commencement, subsided a little, though the wind blew hard all the afternoon and during the night. The air was charged with fine sand for two or three days afterwards. The thermometer during the hurricane was 102°.

On the 14th, while riding near the river, I saw the second storm approach, and it appeared as if an immense chain of sandstone rocks was driven before the wind. I had just time to reach the residence of Signor Boreani, when it overtook me, and darkness came on instantaneously. This lasted for ten minutes, when the atmosphere assumed a deep-red colour, becoming gradually lighter. It was nearly two hours before the hurricane subsided, and it was followed by a slight shower of rain: on the following day the air was loaded with sand. The thermometer at 2 P.M. on this day was 104°. These winds occur two or three times in every spring, and the inhabitants call them *dohr.* The Arabs assured me that these storms had not visited Khartúm for more than three years.

May 18.—I left Khartúm; on the 22nd arrived at El Metemmeh; and on the day following I crossed over to Shendí. Here I remained until the 2nd of June, and during the interval made an excursion to the temples of Musawwerát, El Auweh Tayyib, and Kenísat el Kerbekán. On the 11th I reached Berber, having stopped a few days at El Bekráuwiyáh, to visit the Pyramids of Baï and El Jelásafrát, to which M. Linant has given the name of Gabina.

The greater portion of the land between Khartúm and Berber is uncultivated, though it might be advantageously used for the production of grain, tobacco, cotton, and indigo. The inhabitants have been compelled to serve as soldiers, or have absconded into the desert, in order to avoid it, and there is great room for colonization. They are in the lowest state of degradation and oppression, and are addicted to lying to an inconceivable extent. They entertain the greatest fear of a person wearing the tarbúsh, or red cap, mistaking every one with this badge for a Turk; and whatever a traveller requires he must get done by compulsion. Their services are not to be obtained by promises of money or by kindness: they have been so often deceived by their superiors, that they expect the same from travellers; and I never, but with one solitary exception, found that the word of a native of the Beled-es-Súdán was to be depended upon.

Berber is a place of some importance. From its size, I should think that it contained 8000 or 9000 inhabitants. The houses are generally built of sun-burnt brick, of a square form; and many are enclosed in a small court-yard. It is the rendezvous of the slave-merchants from Sennár and Kharṭúm, on their way to Cairo by the Great Nubian Desert; and a considerable traffic in slaves takes place there. There is a daily market: its present governor is 'Abbás Aghá, a very severe disciplinarian. Berber is a place of great resort of the Bishárí Arabs. 'Abbás Aghá has built a mosque, adorned with a lofty minaret. He also built some shops in the bázár, with the profits arising from the rent of which he pays the people employed about the mosque. The thermometer at Berber varied from 100° to 106°.

Before I left Berber I was obliged to provide myself with skins to carry water from hence to Jebel Berkel, as it is not the custom of the country for the camel-drivers to furnish them. Fortunately there are two magazines, one of new and the other of old skins: from the latter I selected those required for my journey.

June 24.—Early in the morning I crossed from Berber to El Wobsh, a village situated on the opposite side of the Nile; and at 6 P.M., on the same day, I set off for Meraweh; and in 3½ hours I stopped for the night.

June 25.—We proceeded at 5 A.M.; and in 1 hour passed some Bedowin tents. The part of the desert which they inhabit is called Abú Kharráz. In 2 hours from this place I rested until the evening, when I resumed my journey, and halted for the night after proceeding 3 hours farther. Our journey to-day 6 hours.

June 26.—We set off at 5 A.M. and in 2 hours 20 minutes arrived at Korrobí. Here is a small natural reservoir in the mountains, which are of a coarse grey granite. We found water left from the last year's rains, sufficient to fill 7 skins, and, though it had a slightly earthy flavour, it was by no means unpalatable. The main feature of the country between the Nile and Korrobí is its flatness. After leaving the river we passed over alternate strata of sand and coarse gravel. At 6 hours' distance from the river we crossed a stratum of coarse grey granite, and afterwards a fine thin slate, containing abundance of mica. Both the granite and slate are furrowed by large veins of primitive quartz. Afterwards sand and broken quartz cover the desert as far as Korrobí, where, as I have already mentioned, there are mountains of coarse grey granite, broken in a rude, wild, fantastic manner; the masses, large and small, having assumed, from some cause or other, round and oval forms. In the afternoon I left Korrobí, and stopped for the night, after travelling 3 hours.

June 27.—We proceeded at 5 A.M., and in 3 hours passed some

hills of granite on our right, to the N. of the road, and about 1½ mile from it. One is of a conical form, higher and more pointed than the rest, and is called Naṣbel el Ḥosán; and this hill, our guide informed us, is reckoned by the Arabs to be halfway between the Nile and the Wells of Shimáïl: it may reach 800 feet above the plain. The surface of the desert from Korrobí is generally sand; but after leaving Korrobí we crossed a vein of red granite. Jebel Naṣbel el Ḥosán, as well as the hills around it, is of grey granite; and in many places veins of the same rock appear through the sandy surface. Half an hour beyond Jebel Nasbel el Hosan I rested until the afternoon; when proceeding for 3 hours and 20 minutes farther, we halted in a portion of the desert, where, on our left (½ mile south of the road), is a small granite hill named Jebel Naṣbel el Melh.

June 28.—We travelled 7 hours to-day, and rested at the foot of a hill on our left, called Jebel el Medáyet, where we found a solitary Bedowín tent. From its inhabitants we procured some water, which they had brought this morning from Bír Shimáïl; and a great luxury it was, for our own was putrid in the highest degree, and I was suffering from a severe relapse of dysentery, and my thirst was insatiable.

June 29.—We moved on again at 6 A.M., and in 1¼ hour arrived at a steep ascent of 25 feet, which having ascended, we passed over a plain strewed with broken stones, very much resembling in appearance fragments of lava. After passing over this small plain we wound round the S. side of Jebel es-Safrah, the hill being on our right, and then arrived at a spot surrounded by hills, where is situated Bír Shimáïl. The water of these wells is good, free from saline taste, and possessing only a slight earthy flavour. Between Berber and these wells I noticed many gazelles and large coveys of rock-pigeons. The latter abound also in the immediate neighbourhood of the wells. Our journey to-day 3 hours. As I was still suffering severely from dysentery, I determined to stay a couple of days at these wells. Thermometer 100°.

July 1.—At ½ past 4 P.M. I left the wells of Shimáïl, and in 50 minutes we passed on our right what I at first supposed to be an ancient ruined village; but upon inquiry the guide informed me that it was a cemetery of the Manáṣír* Arabs. Upon the spot where each body was deposited a stone wall was built, in form resembling the gable end of a house. Each wall was about 5 feet high in the centre, and 7 feet in length, and constructed of small stones, with some neatness, and not unlike the way in which the stone walls are built as fences to the fields in many parts of Yorkshire. This cemetery is called El 'Arfah.

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* Plural of Manṣúr.

In 1½ hour from the cemetery we reached Bír Abú-karáët. These wells are situated in a small grove of dóm-trees. I had taken sufficient water from Bír Shimáïl not to require to replenish my skins from these, as the guide informed me that though the water was good it was not always in abundance. I observed, however, that the water was springing freely, and that the depth of each well did not exceed 20 feet. At 40 min. beyond I halted for the night, having travelled 3 hours from Bír Shimáïl.

Our tract to-day was exceedingly rough. First, we passed a plain covered with broken stones, followed by a smooth hard surface. Afterwards, we made an ascent, gradual and tedious, and passed over a second plain covered with broken stones, bearing a strong resemblance to the lava of Vesuvius: in fact, the whole plain appeared of volcanic formation. I noticed in many places the lava in a state of decomposition, presenting a similar appearance to that seen at the foot of Vesuvius, though, from the intense heat of a tropical sun, and the small quantity of rain which falls annually in these latitudes, the decomposition was proceeding very slowly. I could not find any craters, or extinct volcanoes.

The hills on each side of our route are distant from each other about 1½ mile. They are numerous, some isolated and others forming small continuous chains. Some are formed of grey granite of a coarse texture, whilst others appear to be composed of freestone. There is no regularity in the disposition of these formations, each appearing when and where one least expected to find them. Of all the scenery I ever witnessed this was the wildest and most savage. There is no verdure, and rarely a single shrub. The desolation is complete.

July 2.—After 4 h. 45 min. travelling, we arrived at Bír Sarniyah, where we remained for the remainder of the day. Before arriving at the wells, we passed a spot where the Arabs turn up the surface of the desert, and at the depth of from 8 to 12 inches they find a saline earth containing impure muriate of soda in large quantities, and from which they make salt for domestic purposes.

Bír Sarniyah is picturesquely situated in the midst of mimosas and dóms. The latter were particularly fine trees, and the ripe fruit hung in clusters upon the branches. There is only one well. It is large, and its sides substantially built of stone. The water is plentiful, and quite free from any brackish flavour, though it is slightly tainted with a putrid taste, which disappears after being a few hours in the skins.

The guide mentioned that the Manásír Arabs, who inhabit this part of the desert, sometimes attack and pillage caravans

whilst reposing at the wells. I therefore deemed it prudent to put on a watch during the night: we were not, however, molested.

July 3.—We left Bír Sarniyah at a ¼ past 6 A.M., and shortly afterwards passed a cemetery of the Manásír Arabs. The sun was so hot and oppressive, that, after travelling 2 h. 50 min., we were obliged to stop until the afternoon, when we proceeded for 2 h. 50 min. more. Thermometer 102°. We travelled for 6 h. 30 min. on the following day.

July 5.—We resumed our journey at 20 min. to 5 A.M., and in 2 h. 50 min. arrived at Ed-dukáyet, a village situated on the Nile. Soon after leaving Bír Sarniyah, the stratum is coarse grey granite, with veins of quartz running from S.W. to N.E., and this structure continues to the Nile.

I was delighted once more to arrive at the river, more especially as passing this desert is very severe travelling, and doubly so to me, suffering as I was from a violent attack of dysentery, which would not give way to any remedy that I adopted, though, for the benefit of travellers in Africa, I may state that I found it universally yield in other cases in the course of a few hours to the internal use of ipecacuanha, in about the dose of 3 or 4 grains every 4 hours. With me this remedy produced no effect, but, on the contrary, aggravated the symptoms, and I consequently tried laudanum, and partially succeeded in controlling it until I arrived at Cairo. From Berber to Ed-dukáyet scarcely a tree is to be found along the route capable of affording the least shade, if we except those in the vicinity of the wells: the trees in fact are little more than bushes. Fortunately, for the first 7 or 8 days, the sun was slighly obscured by clouds, or the heat would have been insufferable. Of all the journeys I have made, this desert is the most wild, arid, comfortless, and uninteresting; and I should strongly recommend future travellers to take the line from El Metemmeh to Jebel Berkel in preference to that from Berber.

The whole of this desert is thinly peopled: from Berber to Bír Shimáil it is inhabited by the Hasáníyeh Arabs; from Bír Shimáil for two-thirds of the way to the river, by Manásír Arabs; and the last third, towards the Nile, by Seïkíyahs.

At Ed-dukáyet the placidity of the stream of the Nile is broken by rocks; and here is a slight rapid. At 1 day's journey from hence, higher up the river, is the fourth cataract.

At ½ past 4 P.M. I left Ed-dukáyet: in 1 hour 30 minutes we passed the village of El Bellal on our right, and in 30 minutes afterwards arrived at the Pyramids of Núrí. In 10 minutes from the Pyramids we reached El Jeráyib, and I repaired to the house of the Sheïkh, where I remained all night.

The land about Ed-duḳáyet is rich, but only a small portion of it is under cultivation. It continues good to El Ḳeráyib. Our journey to-day was 6 hours.

July 6.—At El Ḳeráyib the senna-plant is indigenous, very luxuriant, and in great abundance. If properly cultivated, it might afford a great profit to the grower.

At 5 P.M. I resumed my journey, and in 3 hours 20 minutes arrived at Abdúm, a small village situated opposite Meraweh. The distance from Berber to Ed-duḳáyet was 54 hours 25 mins., or about 137 miles, in a general W.N.W. direction. From Ed-duḳáyet to Abdúm, S.W., 14 miles. The expense of each camel from Berber to Meraweh was 15 piastres [3*s*.].

July 7.—At daybreak I crossed the Nile to Meraweh, which may have a population of about 700. I remained here until the evening of the 14th, when, having procured a boat, I returned to Donḳolah, where I arrived in the morning of the 22nd. On the 25th I took my departure from New Donḳolah, and, after a detention for camels of a few days at Ḥafír, I arrived at Wádí Ḥalfah on the 16th of August, 1837.

To the foregoing paper I beg to append a few observations on the practicability of exploring the sources of the White Nile with a small steam-vessel. If an expedition left Caïro in the month of July in a steamer with a draught of water not exceeding 2 feet, it might, with a little care, pass all the cataracts between Caïro and Khartúm. At high Nile the cataract of Essuan disappears and becomes a rapid. The second cataract is a succession of rapids from Wádí Halfah to the third cataract at Ḥanneḳ, which latter is most improperly called a cataract, since even at low Nile there is hardly any fall, and not so much as to attract notice. The fourth and fifth cataracts I have not seen; but, from inquiries I made, I learnt that they would form no obstacle; and the sixth is passed without the least difficulty.

In passing all the cataracts it would be judicious to have the steamer preceded by a pilot-boat, sounding as it proceeded, to prevent any accident to the former. I mentioned the subject to Mr. Perring, an eminent civil engineer in the employment of Mohammed 'Alí Páshá, and from his knowledge of the Nile and its peculiarities, he very kindly made a drawing of a steamer which he calculated to be adapted for a steam expedition. He recommended a boat of light sheet-iron, 70 feet long on the water-line, 16 feet beam, and 8 feet deep, including the keel, and which would not, with all requisite stores on board, draw more than 2 feet of water. The power to be two twelve-horse oscillating high-pressure engines, and the fuel to be used wood or charcoal.

If a steam expedition left Caïro in July, it would have time to get to Berber by September, where it should remain until the

termination of the tropical rains, which generally takes place there during that month. An express might be sent from thence to Khartúm to order provisions to be prepared and ready against the arrival of the expedition, so that no delay might be occasioned. It would then proceed up the Bahr el Abyad, and I think six months would be ample time to make surveys of both branches of the river. The expedition might then return to Berber, and when the Nile had risen sufficiently high to pass the cataracts in the following year, it should proceed immediately to Cairo.

The expedition might be composed of the following persons:—

Commander.	4 Artillerymen.	
Naval Officer, as Surveyor.	4 Seamen.	
Surgeon.	Dragoman or Interpreter.	Arabs.
Naturalist and Geologist.	Cook.	Arabs.
2 Engineers.*	4 Sailors.	Arabs.
Serjeant of Artillery.		

Just before my departure from Khartúm, I inquired of Khúrshíd Páshá if he thought it possible to send an expedition with safety to endeavour to discover the source of the White Nile. His ideas of navigation were extremely limited; and being unacquainted with the powers of steam, was unable to give an opinion as to the utility of steam-vessels in such an expedition. He said that he had been 21 days above Al-leïs, on the Bahr Abyad, in the boats of the country, and took with him 700 soldiers. He reached Denkah, having passed the country of the Shillúks. He had several times been a considerable distance above Al-leïs. The expeditions were sometimes attacked at night, but never during the day; and he found it necessary to moor the boats at night off the islands, in preference to the banks of the river. The Shillúks were armed with spears and shields, being ignorant of the use of other weapons of war. The pashá was able to procure dhurrah occasionally from the natives; though he said he should recommend an exploring expedition to take biscuits and all its provisions from Khartúm, and provide sufficient for its return. He thought it would be necessary to take 400 soldiers. He mentioned that the river divided a considerable distance from Khartúm, but he was not prepared to say which was the direction of the White Nile, properly so called. He was of opinion that an expedition could not go and return to Khartúm in the boats of the country in less than twelve months; but when I informed him that a steamer went twice or thrice as fast as a country-boat, against the stream and against the wind, he thought that it might be accomplished in six. He said there were a few rocks above Al-leïs. Between Wád Shellái and Khartúm the river is clear of these incumbrances to navigation.

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* Who would put the vessel together in Egypt.

The advantages of an expedition by steam for this survey must be obvious. First, the tribes to be passed through are hostile, not only to Turks and Europeans, but frequently to each other; and a sailing expedition would require a large number of troops for protection, a steam expedition very few, because it would have no difficulty in moving quickly away in case of emergency. Secondly, if troops were taken, provisions must also be taken for them, and this would greatly increase the size and expense of the expedition. Thirdly, a sailing expedition would require more time for making the survey—in all probability a year or more; and, if so, would be obliged to remain in the country during the rainy season, which is so hurtful to Europeans not acclimatised: whereas, in a steamer, all might be accomplished in six or seven months from Berber, and twelve or fourteen months from Cairo.

The probable expense of such an expedition would not exceed 5000*l.*, and if assisted by government with men and stores, considerably less; doubtless, also, volunteers would be found who would gladly serve in a cause which must excite the greatest interest in all geographers.

Annexed is a brief vocabulary of the inhabitants of Jebel Nubah, which is nearly the same as the Koldagí (Rüppell, *Nubien*, p. 372):—

Man	Iddi	Goat	Oguinin	Make haste	Murko do shei
Woman	Iddonin	Ostrich	Tigambin	Come here	Twei
Boy	Nirttaudo	Pig	Kigan	Go away	Ishur
Girl	Teigo	Rat	Komanin	Yes	Olinko
Father	Annaggan	Flesh	Kwaji	One	Ber
Mother	Annanneng	Knife	Kwatwar	Two	Ora
Brother	Anningtang	Milk	Idju	Three	Toju
King	Kuju	Porridge	Kalju	Four	Kinju
Head	Undin	Dhurrah	Windin	Five	Tishu
Hair	Tilgin	Water	Otú	Six	Kwasú
Mouth	Aljo	Rain	Harikojú	Seven	Kwalat
Hand	Osigi	Cold	Kedí	Eight	Iddu
Leg	Koordo	Stone	Kwakandin	Nine	Weddu
Skin	Doitonin	Black	Wuriindin	Ten	Bore
Ass	Ondonin	White	Horinnin	Eleven	Bore-ber-ku
Camel	Calenin	Red	Kelindin	Twelve	Bore-ora-ku
Cow	Tí	Wood	Oronin	Thirteen	Bore-toju-ku
Dog	Boldin	Cannon	Motting	&c.	&c.
Horse	Komjin	As-salám	Kendi Ar-	Twenty	Tarbu
Fowl	Kokondin	Aleikom	krá		

[Mr. Holroyd has also communicated to the Society a list of seventy-seven positions of places on the Nile, between Philæ and Sennar, from observations by M. Linant. Many of these have been used in the construction of the annexed map; but as some of the others differ considerably in longitude from the determinations by Dr. Rüppell, their publication is delayed till we can hear from M. Linant on what *data* his positions depend.]

VIII.—*On the Ethnography of High Asia.* By James Cowles Prichard, M.D., F.R.S.

Since the time of Visdelou and De Guignes, the sanguine hope, once entertained, of illustrating the ancient history of Northern Asia, from resources hidden in the Chinese language and in the archives of the Celestial Empire, seems to have been gradually abandoned. Those writers traced in Chinese books obscure notices of an infinity of barbarous tribes, whose names—and it often happened that their names only were recorded—disguised by a Chinese orthography, could not be recognised as having belonged to any people known to the learned of Europe. Attempts made to identify the races, of whom more ample accounts were delivered in the historical works of the Chinese, with nations known to western geographers and historians, were particularly unsuccessful. They were founded chiefly on some slight resemblances of names, or on accidental synchronisms in the accounts of migratory movements, or on passages of history too imperfectly recorded to admit of a comparison leading to results. It was thus that De Guignes was led into the mistake of identifying the Hiong-nú of the Chinese traditions with the Huns, so well known in the history of the West. That this identification was erroneous, was less apparent to most readers than the circumstance, more easily perceived, that it rested on no shadow of proof, and it was generally inferred that no data were to be found, in the voluminous works which De Guignes examined, that might have rendered possible a more accurate research. But since Abel-Remusat and Julius von Klaproth applied themselves to the investigation, that unfavourable opinion has been gradually changed; new lights have been struck out which are likely to elucidate dark passages in the history of those great nations who performed so conspicuous a part on the theatre of human affairs during the middle ages, and some reason appears for looking to the same quarter with expectation of further success. Klaproth and Abel-Remusat had not access to the oldest and most authentic documents of Chinese history. They have principally consulted abstracts and compilations of a later era; and some important documents have come into the possession of Europeans since the death of those distinguished writers, from which we may expect further contributions to the ethnography of Northern Asia.*

* It seems that Abel-Remusat and Klaproth had never consulted the original annals of the elder Han, the celebrated dynasty who ruled over China from B. C. 163 to 196 after Christ, and in whose time the principal wars between the Hiong-nú and China were carried on. They were only acquainted with the contents of this important work through the great historical cyclopædia of Ma-tuanlin, or the Wen-hian-thoung-khao, compiled A. D. 1321, and in other comparatively later documents. The original annals of the Han have been translated from the Chinese

In the mean time some knowledge has been obtained which is fitted to promote this investigation. It is well known that the high region of Central Asia, reaching through the whole longitude of that continent from the Euxine to the Sea of Japan, is occupied by tribes chiefly nomadic, belonging to three great races of men. These are the Turkish, or the improperly called Tartar race, whose chief country is between the Caspian and the Blue Lake, or Koko-Nor, viz., Western and Eastern Turkestan; the Mongolian race, somewhat farther towards the E. and N.; and the Tungusian or Mandschurian race in Daouria, and what is called Mantschu-Tartary. Since the races of mankind have been distributed with reference to their physical organisation and especially to the form of the skull, it has been a prevalent opinion that the two latter of these races, who nearly resemble each other in the shapes of their heads, belong to one great stock, which is termed Mongolian, and is supposed to have had its origin and abode for many ages in the remote East, and probably beyond Lake Baikal. The Turkish race, on the other hand, is set down without hesitation as a Caucasian stock, or a people akin to the western nations, and originating in the same region of the world as the inhabitants of Europe. The Turks of the race of Osmanli, subjects of the Sultan, and the Tartars in European Russia and the Siberian towns, have the form of the head which is termed Caucasian, and this is generally supposed to be the primitive type of the Turkish race. The great nomadic nations of this race, the Nogays, Kirghises, Turkomans, as well as the remote offsets of the same stock in the distant parts of Asia, as the Jakutes, are known to have a different organisation, approaching nearly to the Mongolian and Tungusian character. It is common to refer this deviation from the form assumed to be the original type of the race to mixture with the Mongolians, whose intermarriages are supposed to have modified the true Turkish form, and to have given rise to the comparative ugliness of the nomadic Turks, according to the European idea of beauty. The fact that many of the nomadic races speak pure Turkish dialects, and display few or no traces of intercourse with Mongolians, must be allowed to be an objection of some weight against this assumed intermixture in stock. But this difficulty has been overlooked. Now, it is an essential part of this hypothesis that the local position of the original Turks was in the same region with that of other Caucasian tribes, and far remote from the cradle of the Mongolian race. All the nations of the West have nearly one type; those of the north-eastern parts of Asia display another

by Father Hyacinth, and published at St. Petersburg in 1829. A part of this version has been translated from the Russian by Dr. Schott, and inserted by Ritter in his excellent Erdkunde von Asien. Th. 5.

form, peculiar from immemorial times to all the various races beyond the Altai. As there is not one instance of a nation that bore originally the Mongolian type originating from or having their abiding place, from the first ages of the world, in the western parts, or amidst the group of Caucasian nations, so it is not to be expected that one particular race from the Mongolian centre should be found to bear, as its genuine and original character, the Caucasian type. Here the historical information derived from Chinese sources comes to our aid.

That the Turkish nations are descended from the Hiong-nú, whose early history* is preserved in Chinese records, has been clearly established by Abel-Remusat and Klaproth. The Chinese records are, in the opinion of the former of these writers, fully worthy of confidence, and sources of authentic history as far back as the accession of the dynasty of Han. Klaproth deduces from them a series of events much more remote in the history of the Hiong-nú. According to that learned writer, the Turkish race, soon after the great deluge, came down from the lofty and now perpetually snow-clad mountains of Tang-nú and the Great Altai, and soon spread themselves towards the S.W. and S.E. It seems that in very early times they took possession of the country on the southern declivity of the highest steppes of Mongolia, to the northwards of the Chinese provinces of Shan-si and Shen-si, and particularly of the region of In-shan, where the mountain of that name, near the northward bending of the Hoang-ho, forms the continuation of the second great hill-system of Central Asia, that of the Thian-shan, or the Mountains of Heaven. This people were, according to Klaproth, styled Hiun-yue, under the dynasty of Shang, which reigned over China from 1766 to 1134 B.C.; under the Tsin and Han, from 256 B.C. to A.D. 263 they obtained the name of Hiong-nú. The time of their greatest power, when they were formidable enemies of the Chinese, and waged frequent and bloody wars with the generals of the Celestial Empire, was before the middle of the second century of our era. Their power was then broken by various accidents, by severe famines, by internal dissensions; the consequence of which was a division of their race into the northern and southern Hiong-nú. The southern tribes allied themselves to the Chinese, and by these the northern hordes were expelled from the ancient domains of the Hiong-nú race, situated between the upper Amur, the Selinga, and the mountains of Altai. The dispersion of the northern Hiong-nú is supposed by Klaproth to have given occasion to the first great movement among the nomadic nations of Asia towards the west.

The enemies of the Hiong-nú increased in power in subsequent times; and, in the first quarter of the third century, the remains

of that celebrated people were overcome and finally expelled from the country which the southern tribes had continued to possess between the desert of Gobi and the northern boundary of China. This is the date of the dispersion and of the wandering march of a great part of the Hiong-nú or Turkish race towards the western parts of Tartary, and of the final occupation of the desert of Gobi and the northern provinces of the Chinese empire, by the tribes who have since possessed the country, and who over China itself have raised several imperial dynasties.

After the destruction of the empire of the Hiong-nú, the Turkish race, aboriginal in the region of Asia which lies between the Amur and the Hoang-ho, abandoned the vast steppes which border on the desert of Gobi and reach to In-shan and the north of China, and dispersed themselves over various parts of Northern Asia. The main body of them found a new country, which became their second home or permanent abode, in the high plains now included in Chinese Turkestan, viz., in the mountainous region of Thian-shan, around Turfan, and reaching eastward to Chamil or Hami, and westward to Karaschar, and northward to Uran-tschi or Bischbalig. The Chinese annals in subsequent ages contain accounts of several barbaric dynasties, founded by tribes of the same race, who held a temporary and limited dominion in the countries farther westward, whither the Hiong-nú had retired. One of them was the empire of the Thu-khiue: a third dynasty of much later origin was that of the Hoei-hou.

It was in this region that the Thu-khiue became known to the Byzantines and to Europe in general, under the name of Turks. An embassy was sent by the younger Justinian to the court of the sovereign of the Turks, in 596, who reigned in Ektag, or the Golden mountain, over the greater part of Central Asia. It was on this occasion that the people of Constantinople first heard the name of their future conquerors. It seems that the Turks had at this period conquered the greater part of the country between Mount Altai and the eastern shores of the Caspian.

In the middle of the eighth century, according to Klaproth, the empire of the Thu-khiue was destroyed by another Turkish people, likewise descended from the Hiong-nú, who came from the countries situated to the southward of lake Baikal. These people were called Hoei-hou, and by some writers Hakas: they ruled for 100 years over the Turks of Altai, but were partly extirpated and partly expelled by the Chinese. A remnant of the Hoei settled in Tangut, to the northward of the Koko-Nor or Blue Lake. At length, in 1257, the Hoei were conquered by the overwhelming armies commanded by Tschengis and his Mongoles. A part of them retired farther westward and settled in the towns which are to the southward of the chain called the Mountains of

Heaven, where they became amalgamated with the Ouigours, the earlier inhabitants of the same districts, whose language and origin were the same as their own.

I have mentioned the Hoei-hou first, in order to distinguish them the more clearly from the Ouigours, with whom they are frequently confounded. The Chinese term the latter people Wei-ou-eul (ūy-ū-ŭl), which answers in Chinese orthography to Ou-ig-ūr.* The Ouigours are the ancient inhabitants of the plains of Chinese Turkestan, where they had dwelt for many centuries before they were conquered by the nomadic people of the same race, termed Hoei-hou. They came in ancient times from a high country to the N.E. of the wilderness of Gobi, near the sources of the Orghon and the Selinga, where they were followed by the Mongoles, who occupied their former abodes, to the plains of Turfan and Chamil or Hami, and between Lake Lop and the river Ili. Here at an unknown period they laid aside their nomadic habits and became agriculturists and the inhabitants of towns, among which were those of Turfan, Chamil, Aksou, Kashgar. To the northward of these places was the more celebrated state of Khotan, which was for centuries the principal town of High Turkestan, and the history of which Abel-Remusat has elucidated from Chinese sources. It was in the vicinity of Khotan or Iu-thian that the celebrated traveller Lao-tseu is said to have erected a temple in honour of Buddha in the sixth century before the Christian era. Khotan became afterwards the metropolis of Buddhism or the religion of Fo, in Tartary, and the inhabitants of Central Asia had adopted that religion, and with it a certain degree of civilization, many centuries before it reached the Mongoles or the Mandschures. According to the historians of the Wei, the religion of Fo was widely spread in these countries in the fourth century B.C., and they were overspread with temples, towns, and monasteries of persons of both sexes, devoted to the monasticism of the Lamaite superstition. In times long anterior at least to the era of Islam, Khotan was the emporium of trade between China, Persia, and India, and it was the medium by which the religious doctrines brought into it from India, through Kashmir, were disseminated over China and the whole N.E. of Asia. It retained its independence till the extension of the Mongolian power, and subsequently, with the rest of Eastern Turkestan, came under the dominion of China. Khotan has been visited by two Europeans: by Marco Polo about 1280 A.D., and by Benedict Goez, the discoverer of China, in 1604. The former found the people already Mohammedans, and their towns abounding to superfluity with all the supports of human life—with cotton, flax, corn, and wine: the inhabitants were devoted to agriculture and manufactures, but were bad soldiers.

We thus discover the patriarchal stem of the great Turkish race at that era when the light of history begins to dawn upon the East, still planted as one member in a group of nations, isolated in a remote region of Asia, on the borders of China, or between them and the lofty desert of Gobi which sends its streams on one side to water the Chinese empire, and on the other to the Frozen Ocean. These nations are far removed from the centre of the western or Caucasian race, whose physical type is so strongly contrasted with the Mongolian. Without assuming that there is a close relation between the physical organisation of human races and the regions of which they have been the immemorial inhabitants, it yet seems extremely improbable that a stock so situated was originally of the Caucasian type. The question is one of more interest in regard to the physical history of our species than it at first appears to be. It is fitted to excite us to further inquiry into the relation between the Turkish race and the other nations, who by their local positions belonged originally to the same group. Philological researches are alone calculated to throw satisfactory light upon this subject. A comparison of the language of the Turkish, Mongolian, and Tungusian races is not, as may be supposed, altogether new or unattempted. It has suggested itself to several writers since the time when Adelung and Vater first laid open and marked out the great field of philological research; but Abel-Remusat, until very lately, was the only writer who had entered far into this subject. The philology and literature of the Turkish nations was in particular his investigation. By exploring the history of the Ouigours or eastern Turks, and of their curious language, the first of the Scythian dialects that was reduced to writing, he discovered an important link in the chain of these languages which connects the western Turkish with the idioms of the Mongols and Mandshurians. Some later writers have followed up this investigation; among them the most distinguished is Dr. Schott, who has seen further into the structure and affinities of the Scythian languages than any former philologist. As this inquiry affords the only probable way of discovering what original relations existed between the three great races of High Asia, I shall endeavour to collect and lay before the reader, in as short a compass as possible, the results of all the inquiries yet instituted.*

Adelung considered the Turks, Mongolians, and Tungusians, to be three distinct races of men, each having a peculiar and original language; and he supposed these languages to be quite uncon-

* See Adelung, Mithridates, Th. 1.; Scherer in Fried. Adelung's Nachträge zu dem ersten Theil des Mithridates; Abel-Remusat, Recherches sur les Langues Tartares; Julius von Klaproth, Asia Polyglotta; Dr. Schott, Versuch über den Tatarischen Sprachen; F. Ritter von Xylander, Das Sprachgeschlecht der Titanen; Gyamathi, Affinitas Linguæ Hungaricæ, &c.

nected with each other, and with all other human idioms. It is so much the more remarkable, in his opinion, that the Tungusian, though confined to the eastern extreme of the ancient continent, contains some words common to it with languages spoken in Europe, such are the following:—

TUNGUSIAN.	EUROPEAN.
Sengui	Sanguis (Latin).
Ura (hinder-part)	οὐρά (Greek).
Tschop (top of a hill)	Zopf, top, tuft (Germ. Eng.)
Non (virgin)	Nonne, nun (German).
Heren (master)	Herr, Herrn (German).
Kiesun (to talk)	Kosen (German).
Hife (oats)	Hafer (German).
Farsche	Part.
Fialhou	Foul.
Furu	Fury.
Fourdan (a way)	Fordh (Welsh).
Latu	Late.
Malu	Malleus.
Morin (a horse)	Mähre (German).

In the time of Adelung there were no accessible sources of information respecting these languages that were sufficient for enabling him to form a correct opinion as to their affinity or diversity. Of late years materials have been acquired which lessen this deficiency, and an opinion has gained ground which is opposed to that maintained by Adelung. The first writer who appears to have been strongly impressed by the analogy which really exists between the different idioms of Tartary, was Scherer, a librarian at Münich. He observed that a, comparison of corresponding sentences in these languages indicates a striking resemblance both in the structure of phrases and in particular words. Scherer's remarks are founded on certain passages in versions of the Lord's Prayer in Turkish or Tartar dialects, in the Mandschu dialect of the Tungusian language, and in the Kalmuk dialect of the Mongolian, and they likewise contain one or two references to an extract from a Kalmuk romance in Benj. Bergmann's Nomadische Streifereyen. The following are Scherer's specimens. Octorgai-du (Kalmuk), i. e. *Heaven in.* In Turkish the same construction, *Tangri-de.*

Tani neretani, Kalm. i. e. *vestri nomen vestrum.* Turkish, Senin adin, i. e. *tui nomen tuum.*

Abga-de thege meni ama—Mandschu. Compare Goek-de degen benin atam—Turk. i. e. *Heaven-in dwelling my Father.*

The expressions, "Bayassuk-sani dula," K., i. e. "*the rejoicing for,*" in German, "*Zu erfreuen um,*" and "oengoeroel-duktu adali," i. e. *the forgiving like,* or "*dem Vergeben gleich,*" also

Kalmuk phrases, and "eget-schi," *evil-from*, in Mandschu, are constructions completely analogous to those of the Tartar or Turkish language.

Scherer subjoins a collection of words which strikingly resemble each other. In this point of view we shall hereafter have occasion to compare the languages of the three nations. He also first pointed out the analogy which is to be recognised in the elements and composition of words. These elements, especially the guttural and nasal consonants, are strikingly alike in the Mongolian, Mandschu, and Turkish. This correspondence is displayed in the fact that the same alphabet has been found well adapted to all these idioms. The Ouigours, as it is well known, were the first Turkish nation who learnt the art of writing. They were taught the use of letters by Nestorian or other Syrian missionaries, and by them the art was communicated to the Mongoles and the Mandschures. These Ouigourian characters, says M. Abel-Remusat, are found to express the vocables of the Mongolian, Mandschurian, and Turkish languages, just as texts drawn from the Neskhi, Cufic, or Mauretanic, are spelled with nearly equal facility in the ordinary Arabic characters.

Scherer also noticed in the structure of Mandschu and Mongolian words, and in the arrangement of the elements of which they are composed, that remarkable peculiarity which Viguier pointed out in his Turkish grammar as a characteristic of some Turkish dialects, and which he termed the Quadruple Harmony of Vowels. It consists in the rule that a given vowel occurring in one syllable of a word, or in the root, requires an analogous vowel—that is, a vowel belonging to the same set, of which sets there are in the Turkish four—in the following syllables of the same word, or in the particles appended to it, which therefore alter their vowels accordingly.

This law in the formation of words constitutes a very remarkable feature of analogy in the languages of Tartary or of Central Asia. The rule which exacts the harmony of vowels, as above described, pervades the original component materials of these dialects, and it therefore seems necessarily to carry us back for the period of its origination to the age of their first developement. The languages in which this law prevails are not only the Turkish, Mongolian, and Mandschu, but likewise some others, all of which have been observed to display, in various particulars, marks of relationship more or less decided with the same class of human idioms. The Hungarian language, which belongs to the class of the Finnish or Uralian dialects, displays the influence of this same principle of formation in the most extensive degree. In that language, the vowels of the primitive word or root have a predominant influence over the vowels of the adjunct or servile syllables. In the other languages above mentioned, the vowels

of the suffixes, or of the additional syllables which are appended to words, and perform the office assigned in other languages to inflexions or the terminations of case and number, take different vowels, according to the vowels of the word to which they are appended. Thus, *sza* and *ta*, which are signs of the plural in Mandschu, become *sze* and *te*, when they are suffixed to words containing *e*, or a vowel analogous to it. An attention to this harmony of vowels is likewise perceptible in the entire structure of polysyllabic words; such in Mandschu are *sarapa, angara, ele, eme*. Words similar to αγκυρα, χαριζομαι, ελωρ, would not be tolerated in this language.

Another peculiarity prevails through the formation of words in the Turkish and Mongolian languages, in which certain consonants can only be pronounced in juxtaposition with certain vowels: some consonants require to be joined with *a, o, u;* others admit into connection with them only *e*, or the analogous diphthongs *oe* and *ue*.

These analogies in the structure of sentences, and still more such as are found in the composition of words themselves, are very remarkable. It seems difficult to account for them satisfactorily, either by referring them to accidental coincidence, or on the supposition that peculiarities so deeply inlaid in the component materials of languages can have been acquired or adopted through the imitation of foreign idioms; and this leads us to inquire whether confirmatory proofs can be discovered of a common origin, either in the grammatical framework of these languages or in examining the primitive words of which they are composed.

On comparing the Mongolian, the Mandschu, and Turkish languages, in relation to their grammatical structure, a series of very remarkable analogies is discovered. The resemblance of the Mongolian and the Mandschu is much closer than between either of them and the western dialects of the Turkish language. These dialects, especially that of the Osmanli, have been subjected to a foreign influence and culture, the result of intercourse with Persians and Arabians, and the introduction of Mohammedan literature among the Turks. But in the most essential points in which the western Turks differ in the grammatical forms of their language from the more remote nations of Turan, the eastern Turks or the Ouigours, tribes of the same race who dwell within the Chinese empire, and have never emigrated, and have therefore much less associated with people foreign to their race, actually differ from the Osmanli and approach to the Mongolians and Mandschures. The Ouigours themselves have indeed cultivated a peculiar literature from a remote period, and it is therefore likely that their idiom should be found more improved, both by the development of its native resources, and by embellishments from foreign intercourse, than the Mongolian or Mandschu.

Yet it retains much of its apparently original simplicity, and certainly some very remarkable traits which are common to it and to those eastern languages. Some of these characteristics are also discovered in the idioms of the Finnish and Hungarian nations.•

The principal features of this grammatical resemblance may be comprised under the following heads:—

1. Words have in these languages no inflexions which can be so termed in the strictest sense; they admit no formative prefixes, allow no modification in the constituent elements of roots, nor any change, generally speaking, in the endings; they express the relations of nouns only by suffixed particles, of which they have a sufficient variety; the modifications of meaning in verbs are denoted likewise by suffixes; all these are joined for the most part to the unaltered root; to it they rather become adherent than are really compounded with it. There is a juxtaposition or aggregation of such auxiliary words, and no real cohesion.

Thus the plural number of nouns is marked by additional particles which do not form a part of the words, and may sometimes be written separately. Separate words, indicative of plurality or multitude, are added in the Mongolian and Mandschu, as also in Chinese. Among the separate words indicative of plurality one is common, as Dr. Schott has observed, to the three principal languages of Turan; *chamuk*, in Mongolian, is *qamuk*, or *qamu*, in Turkish; in Mandschu, *gemu*. Compare ὁμου and γεμει.

It is a peculiarity of the Mandschu that the only nouns which have plurals are significant of things which have life; all other substantives are indefinite as to number. In the Ouigour dialect of the Turkish, the particle which in other dialects denotes the plural is never appended to nouns, which are therefore found in the same indefinite state; yet this particle exists in the Ouigour language, and is used for forming a plural in pronouns.

The derivation of these pluralising particles is unknown; but it is apparent, as Dr. Schott has observed, that those used in the different languages are of cognate origin. The Mandschu and Mongolian have only what may be termed a dialectic difference, and even the Turkish and Finnish are plainly allied. Thus the Mandschu plural particles *sza, sze, szi, ta, te, ri,* are analogous to the Mongolian *sz, d, od, nar,* and the Mongolian *nar* to the *lar*, or *ler*, which is the Turkish plural ending, since *n* and *l* are in these languages interchangeable consonants, as it has been abundantly proved by Dr. Schott. In the Finnish dialects, properly so termed, the plural is formed by adding *t*, which in the Lapponic, as well as in the Magyar, is replaced by *ch* or *k*.

Cases are likewise formed exclusively in these languages by appended syllables, or suffix particles, if they may be so termed.

These particles display unequivocal marks of a common derivation in the several languages. Thus, the signs of the genitive case, or of possession, are as follows:—

Mandschu—ni, i. Turkish—ning, üñ. Mongol—üñ, ü, yin.

The sign of the ablative is in Mandschu the particle ZI, that is, TSCHI, postfixed; in Mongolian, ETZE: these are, as Schott remarks, nearly related among themselves, and with the Finnish ST or STA. The Turkish has DEN, a form nearly parallel to the Greek θεν, and used precisely in the same manner. The Turkish *den* is a modification of the locative and dative particle *de*—compare θί. It is remarkable that *da, de,* or *du,* is the particle answering to *in,* in the Mandschu, Mongolian, and Turkish.

Abel-Remusat has remarked that the termination *tschi,* after a verb, becomes the formative of the agent noun in each of the three great Tartar languages. Another characteristic feature in all the High Asiatic languages, including the Mandschu, the Mongolian, and Tartar dialects, and the Finnish and Hungarian, as well as the Chinese, is, that the nouns, both substantive and adjective, have no gender; they are in form neither masculine nor feminine. When, in speaking of living creatures, it is necessary to distinguish sexes, this object is attained by appending words meaning male or female. These words are, in Mandschu, *khakha* and *khekhe;* in Mongolian, *ere* and *eme;* the Mongolian *ere* has been compared with the old Scythian word for *man,* οιορ, and with the Greek ἄῤῥην. In the Turkish *er* and *erkhek,* meaning male, correspond to the Mongolian *ere,* and *kas* or *kys* to *eme* or *khekhe.*

2. A want of inflexion in the forms of words always renders it necessary to observe strict rules as to their collocation, in order that their mutual dependencies and relations may not be mistaken. But in the Turanian languages very peculiar laws prevail as to the precise order of words and their arrangement in sentences. Dr. Schott observes that every word which influences the meaning of another, and denotes any circumstance, or defines any mode in its relations, must always be prefixed to it. Thus, adjectives uniformly precede nouns, adverbs verbs, the possessive pronoun the thing possessed, and clauses dependent on a relative precede the relative; nouns affected by a preposition always precede the preposition or the word which has the force of a preposition. It is difficult to bring this last fact under the meaning of the rule above stated. The circumstance, however, that prepositions, or rather particles used instead of prepositions, always follow nouns, is one of the most striking characters of the Turanian languages. In all other instances, prepositions are appended or suffixed in a manner precisely analogous to that in which they appear as substitutes for the terminations of cases, and it is indeed somewhat

difficult to point out a distinction between these modes of using servile or subsidiary particles.

In the Turkish and Finnish dialects, although the same laws prevail in general, yet some occasional deviation takes place from the rigid law of collocation established in the Scythian languages. This appears chiefly in the Osmanli and the Magyar, and is attributed to the influence of Persian and Arabic on the one, and of the European languages on the other. In general, however, the Turkish dialects have in this particular the same habitude which is characteristic of the High Asiatic languages:—

"Un trait commun à tous les dialects Turcs," says M. Abel-Remusat, "sans excepter le Turc oriental (*i. e.* the Ouigour), c'est l'inversion perpetuelle si contraire à nos habitudes, il semble même qu'on peut dire, si contraire à la nature. Ici, comme en Mandschou et en Mongol, le mot qui régit se place toujours après celui qui est régi, et le verbe principal, auquel viennent ressortir directement ou indirectement tous les mots d'une phrase, doit toujours être mis à la fin. Les mots composés, les noms en rapport, les particules, les phrases incidentals, tout est soumis à la même règle; et si dans les textes Ouigours on trouve des cas où elle semble negligée, on s'apperçoit aisément que ces exceptions sont l'effet immédiat et palpable d'une influence étrangère."

3. The preceding observations relate chiefly, though not exclusively, to nouns, and the method of collocation which the peculiarity of their structure makes necessary. The following remarks refer principally to verbs:—

Circumstances or modes in action which other languages express by means of adverbs, by separate pronouns, or by auxiliary verbs dependant on the principal verb, are expressed in the Scythian languages by means of particles or particular syllables brought into immediate connexion with the verbal root, and serving to denote all such modifications in its meaning.

With one single exception, which is that of the Osmanli Turkish, a mixed dialect disguised by a peculiar culture under the influence of a foreign literature, all the languages of Eastern Asia display the greatest simplicity in the formation of verbs. The root of the verb is always the imperative. By the addition of particles to the imperative, all the modifications of which these verbs are susceptible are induced. It has even been proposed by some writers to characterise all these languages by a term derived from this circumstance. The Osmanli, as I have observed, forms an exception to the simplicity or poverty of the other languages comprehended in the same class. It employs a verb substantive as an auxiliary verb, a thing unknown in the cognate idioms. It forms a great variety of compound tenses and moods, and has complex derivative conjugations, such as those called transitive, co-operative, reciprocal, and inceptive verbs. Of all these no vestiges have been discovered in the Ouigour or

Eastern Turkish, which, on the contrary, has all the simplicity of the other Turanian languages. It employs no auxiliary verb, has no compound tenses. By means of post-fixed particles it forms a present and a past tense, and it has been found to possess no other modification of the verb indicative of time.*

4. Most of these languages are scantily provided with conjunctions, but rich in gerunds, which actually contain conjunctions, and render separate and distinct particles unnecessary; even when the gerunds, or the participles which supply their place, are less numerous, they are still frequently used. Thus, as Dr. Schott observes, are formed long-winded and singularly involved periods, especially in the Turkish language, which it is quite impossible to translate, their construction being preserved.† From this want of conjunctions and tendency to form involved periods, the infinitives and participles assume the character of verbal nouns, and are brought more frequently and with greater boldness into connexion with pronominal suffixes, and with the terminations of cases belonging to nouns, than in any other language. Hence an apparent copiousness in verbal inflexion which is in fact a simplicity and poverty of structure. Some instances of this kind may be seen in the short citation above made from Scherer, in which the same construction appears in all the languages compared. Verbal nouns, which resemble in form the Greek θελημα, become in construction with pronouns real verbs.‡ With that form indeed the infinitive mood ending in *me* or *ma* in Mandschu, and in Tartar or Turkish in *mek* or *mak*, may be compared. In this want of analysis in construction, which is so striking a characteristic of the High Asiatic languages, the Turkish fully participates. It is remarkable that the Osmanli, which possesses a greater variety of forms than the pure Turkish or Ouigour, scarcely derives any advantage from them, as if it had not been able to shake off the yoke originally impressed upon it, and to accustom itself to the liberty which it has acquired.

" L'usage des temps simples et impersonnels," says M. Abel-Remusat, " viennent souvent y obscurcir les idées, que les temps composés exprimeraient avec netteté et précision." " Les Ouigours ont évité les principaux inconvéniens de ce système, en suivant un marche simple et naturel, qui empêche d'être élégant, mais permet d'être clair. Les autres Turcs, qui, sans renoncer à l'emploi fréquent des participes, ont voulu porter dans leurs compositions un style plus orné, et construire leurs phrases d'après un plan plus compliqué, n'ont réussi qu'à rendre la construction embarrassée. Chez eux une longue periode, imparfaitement soutenue par le rétour fréquent du gérond ou du participe, conduit souvent le lecteur au bout d'une page, sans lui offrir le verbe d'où

* Abel-Remusat. Recherches sur les Langues Tartares.
† Versuch über die Tatarischen Sprachen.
‡ " Ritter F. Von Xylander." Die Sprache der Titanen.

dépend le sens de la phrase entière. C'est de l'aveu des plus habiles dans ce genre de littérature, ce qui fait que la lecture des ouvrages Turcs est toujours difficile et fatigante."

These general remarks are sufficient to point out the nature of that analogy in genius and structure which exists between the languages of the Tartarian nations. I shall now add some particular grammatical forms, which exemplify their connexion.

There is no class of words in which the oldest forms of languages are so well preserved as in pronouns, as any one is aware who has any accurate knowledge of the classical languages.

The personal pronouns are as follows:

	I.	Thou.	He.
Mongolian	Bi	Tschi	Tere
Mandschu	Bi	Si	Tere, I
Turkish	Ben	Sen	Ol, O
Ouigour	Man	San	Ol
Finnish	Ma	Sa	
Esthonian	Ma, Minna	Sa, Sinna	Ta, temma
Lapponic	Mon	Don	Son
Hungarian	En	Te	Oe

N.B. The third person is in reality wanting in most of these (as in Greek), and the place is supplied by a demonstrative.

Genitive.	Of me or mine.	Of thee or thine.	Of him, his.
Mongolian	mini	tschini	ta
Mandschu	mini	sini	tereï
Turkish	benüm	sening	aning
Ouigour	maning	sangge	aning
Dative.	**To me.**	**To thee.**	**To him.**
Mongolian	mendou	tschimdou	
Mandschu	minde	sinde	
Turkish	bange	sange	ange
Ouigour	mangge	saning	angge
Plural.	**We.**	**Ye.**	**They.**
Mongolian	bida	ta	te-det
Mandschu	be	souwe	te-set
Turkish	biz	siz	an-lar
Ouigour	bis-lar	sis	o-lar
Finnish	me	te	
Esthonian	meie	teie	neet, nummad
Lapponic	mi, mige	ti, tiye	si
Hungarian	mi, miyuk	ti, tiyeä	oe-k
Genitive Plural.	**Of us, our.**	**Of you, your.**	**Of them, their.**
Mongolian	minu	tschinu	
Mandschu	mini	sini	ini
Turkish	bizim	sizing	anlarong
Ouigour			alar-din

Dative Plural.	To us.	To you.	To them.
Mongolian	mendou	tschendou	tcdendou
Mandschu	mindeu	sinde	terede
Turkish	bize	size	anlare
Ouigourian	bis-ke	sis-ke	alar-ke.

It must here be observed that the pronoun of the third person is in many instances defective in several of these languages, and made up of demonstratives and of other substitutes. Hence there is great variety in the forms apparently belonging to this personal pronoun. But those of the first and second display the most striking resemblances in all the above languages; the differences may be considered as merely dialectical; and the pronouns of the third person correspond when they are extant. Even the irregularities of one language correspond with those of another.

We must not omit to observe that the Mandschu has another form answering to the plural of the 1st person, viz. *mouse,* regularly formed as a plural by addition of the pluralising particle from *mou.* Compare the Lithuanian *mès,* genitive *músû,* dat. *mús.* This word is used when the speaker includes the person whom he addresses together with himself in the same *we;* a variety in the number and conception of personal pronouns, which is well known in the languages of the Algonquin and other American nations, and has been considered as peculiar to them.

The Mandschu, Mongolian, and Turkish languages have, according to the peculiar genius of those idioms, syllables which, suffixed to the attributes of the subject, form a sort of possessive or attributive participle or adjective, and answer the purpose of relatives governing clauses. This requires explanation.

In Mandschu, *aracha*-ngge means *written-having,* or "quiscripsit;" minde-buche-ngge, to me given-having, "qui mihi dedit." The particle *ngge* means possession, *belonging to;* as nijalma-i-ngge, *i.e.* "menschen-wo," "what belongs to man," and it thence becomes the sign of the possessive case. This *ningge,* or *ngge,* of the Mandschu is likewise found in Turkish, in the particle indicative of the possessive case, which is *ning.* The Mongolians have a particle, *ki, gi,* and *kei,* which they use just as the Mandschures use *ngge* for a sort of relative suffix. The Turkish alone has a separate relative pronoun, *kim* and *ki,* which is even found in the Ouigour, or pure Eastern Turkish dialect, and this may be prefixed and used as is the relative pronoun in the European languages. The use of this is, as M. Abel-Remusat observes, foreign to the grammatical structure of these languages, and the Ouigour has the means of substituting for it a suffix particle like the other idioms of Northern Asia.

From the Mandschu *ningge*, or *ngge*, compounded with the possessive pronoun, or rather with the possessive case of the personal pronoun, and from corresponding words in Mongol and Turkish, arises a sort of abstract relative which is very remarkable from its almost exact identity with the German *meinige*. Thus, mini, sini, &c., make in Mandschu, *miningge, siningge, iningge* (literally mi-ni-ngge, viz. "mine what is" or "mine being," in German, "das meinige," "das deinige," "das seinige." In Mongolian the corresponding form is minüge, tschinüge, ekonüge; in Turkish, minningki, seningki, aningki.

The verb-substantive is another part of speech which retains very old forms in many languages. The Mandschu has two verbs used in the sense of *to be;* these are *bi*, meaning properly *to hold*, or abide, as in the infinitive *bime*, pres. indic. bimbe; this resembles and *may be* cognate with the Sanskrit, bhu; Welsh, bû; be, bin, buwain, *φυω*, fuo, of European languages. Another verb, more strictly a verb substantive, in Mandschu, is *ome* (εμεν). The Mongolian has bü-kü (φῦναι), and present bui (ich bin) and acho (esse), amui (I am). The Turkish has only ol-maq (properly, fieri): with this we must compare the Finnish infinitive olla, Esthon, ollema, in the pres. tense, 1. olek, 2. olet, 3. on; pl. 1. olemme, 2. olette, 3. owat; and the Lapponic corresponding form, 1. lem, 2. lek, 3. la; pl. 1. lep, 2. lepped, 3. lak.

The preceding instances answer the double purpose of showing resemblances in vocabulary, and also in grammatical forms between the different Scythian languages. It is impossible to doubt of the original affinity of the pronouns in all these idioms, or of those of the verb-substantive. What is more surprising is the resemblance which displays itself, without being sought, between these Scythian forms and those of the Indo-European languages. The consideration of this last subject would be foreign to my present undertaking, and I shall merely remark, with respect to it, that the resemblances in particular grammatical elements, as in the pronouns especially, and also those which may be pointed out in radical words—of these a short specimen has already been given from Scherer, which has been greatly extended by Klaproth—between even the most western European languages and the Mongolian and Mandschu, spoken in the extreme east of Asia, are certainly too strong and decided to be attributed to mere accidental coincidence, while, on the other hand, it is impossible to account for these phenomena by referring them to occasional intercourse, a thing which cannot be imagined between nations so widely remote from each other. If we attempt to resort to the only explanation that remains, namely, the hypothesis of a common origin, we seem to be carried back beyond the period open to historical or even ethnographical research.

We come now to the inquiry whether, and to what extent, there is a connexion in regard to the vocabulary and the stock of primitive words between the Turanian languages. It may be observed that, if no such affinity is found, we shall consider them to be one class of languages, a class strongly marked, and the members of which are nearly related to each other by such analogies as constitute a class, but we shall not venture to declare that a family relation exists between them, unless it be allowed that resemblance in grammatical construction, where it amounts to a certain degree, constitutes by itself this relation. Many have thought so, and they have reckoned the polysynthetic idioms of America, and the monosyllabic idioms of the Chinese and Indo-Chinese as languages respectively of one kindred stock. On this ground, the languages of the Turanian nations would be considered as one family of languages, even if no roots should be found common to them.

Father Gerbillon, who travelled in Chinese Tartary, in the suite of an expedition commanded by the Emperor of China, and whose "Elementa Linguæ Tartaricæ" was the first work that appeared in Europe on the Mandschu language, was of opinion that only seven or eight words in that idiom were similar to the Mongolian. It has been generally supposed that there is an almost equal diversity between the latter and the Turkish, notwithstanding the tradition collected by Abulghazi Khan of the common original of the two races of people speaking these idioms. M. Abel-Remusat says that Gerbillon was greatly mistaken; both he and Klaproth affirm that a large number of similar words exist in these languages, though they do not thence infer a common origin. M. Abel-Remusat makes a distinction in reference to this point, which supports a very strong argument, and cannot easily be set aside if the fact is exactly as he considered it to be. He divides words into different classes; one class he terms words of the first necessity and simplicity, and thinks common to all nations, springing from the same stock; another set are words of a merely secondary kind, such as simple nations adopt from their neighbours; a third class denote ideas which indicate refinement. The first class contains such expressions as those of kindred, father, mother, husband, wife, &c., and words denoting parts of the body, hand, head, &c., striking external objects, sun, moon, star, tree, river, and numbers up to ten. Secondary words are terms for domestic animals, metals, fruits, esculent plants, instruments of agriculture, of war, and other arts. The third class contains names for offices, dignities, &c. M. Abel-Remusat says, that of words belonging to the second class a great proportion are common to the Mongolian and Mandschu particularly, but that the terms included in the first class are distinct in each

of these idioms. He therefore considers the Turanian nations as separate and different races.

A late writer, who has investigated this subject with great accuracy, has called in question inferences drawn by Abel-Remusat, as well as the data from which they are deduced. His work, to which he has given the modest title of "Versuch über die Tatarischen Sprachen," indicates a deeper insight into the genius of the Scythian languages than any former writer has displayed. Dr. Schott begins by observing, that even in idioms between which a near affinity has been completely established and is universally allowed, a multitude of words radically distinct from each other may be found to express the most universal ideas and objects of the first necessity. What resemblance is there, for example, between our German word sohn, a son, and the Greek υἱος, or between sohn and tochter, and filius and filia? Who would connect bruder, or brother, with ἀδελφος; sister with αδελφη; frau with woman, femina, or γυνη; man with vir; gattin or gemahlin, wife, with uxor and ἀλοχος? How is himmel, heaven, related to cœlum, οὐρανος, and the Russian niebo? How earth, terra, γη, and the Persian zemin? How moon, luna, and the Sanskrit tschandra? our sun and the Persian churshid, mihr, and afitāb? kopf, head, and the Persian szer? hand, manus, χειρ, and deszt? mund, os, dehān, στομα, and the Russian rott? baum, tree, arbor, δενδρον? vogel, bird, avis, ορνις, and the Russian ptitza? stone, saxum, πετρα, and Russian kamen? All these, and very many other words, in languages known to belong to one family, express ideas of the most simple class, and are yet totally diverse. Similar instances are afforded by a comparison of the Semitic languages, whose relation to each other is in other respects scarcely more distant than that of dialects of one speech. The moon is in Hebrew yārēach, in Arabic qamar; a hill, Hebrew, hōr, Arabic, jebel; a tree, Hebrew, ētz, Arabic, shedsher; a stone, Hebrew, ebhen; Arabic, hajar. Even in the very same language, words are often found expressive of necessary objects, which, though exactly synonymous, are totally different in several provincial dialects.

These instances are quite sufficient to prove that a considerable number of different words, even though expressive of ideas of the first necessity, do not disprove a family relation between languages. In the Scythian languages as in the Indo-European the same roots are often discovered, with some deviation in their meaning. It must also be observed that words themselves undergo in the Scythian dialects modification from the interchanges of particular consonants and vowels. In this way many words derived certainly from the same origin are so disguised that, without attention to the laws which govern this interchange, and which

Dr. Schott has been the first to explore with respect to the Scythian languages, their real affinity could hardly be recognised.

The following is a short selection of examples in which words of the same origin are found in several of these languages, expressive of ideas nearly related to each other.

In Turkish *gol* or *goel* means a lake: in Mongolian *ghool*, a river: *golo* in Mandschu is the bed of a river. The sea is in Turkish *dengiz* or *deñiz*: in the Magyar or Hungarian, *tenger*: *r* and *z* are shown to be frequently interchanged. In Mongolian *tenggisz*, and in Mandschu *tenggir*, means a *great lake*. In Mandschu *alin* (Mong. *aghola, oola*), a mountain: in Hungarian *alom*, a hill. In Turkish *qaya*, a rock: Hung., *koe, köv*; and in the Finnish languages *kii, ku*, a stone. The Mongolian *tsilagh-on*, a stone, resembles the Hungarian *szikla*, in the word *kö-szikla*, rocks, which seems to be compounded of two synonyms.

For *ice* the Finns have the word *yeg, yegna*: the Hungarians, *yég*. To this word the root of the Mongolian word *yik-ekün*, cold, frost, corresponds, while the Mandschu *juche* again means *ice*. With *juche* the Turkish *szuq*, or *saghouq*, cold, is closely connected.

The Mongolian *aldar*, and the Mandschu *elder*, mean shine, splendour: in Turkish we have *ilder-im*, or *yilder-im*, lightning, and *yeldiz* (for *yeldir*), star. The sun is in Mongolian *nar-an*: summer, the sunny season, is in Hungarian *nyár*: in Turkish *yaz*, written for *yar*, by the interchange of consonants. In German and English the names for sun and summer seem to be in like manner related.

The Turkish for heaven, *gök, gökler*, pl., does not occur in that sense in the other Scythian languages; but in the meaning of *blue*, which it has not lost in Turkish, we recognise it in the Hungarian *kék*, the Mongolian *köke*, and the Mandschu *kuku*.

Boi in Turkish, form, stature, is related to *beye* in Mongolian and Mandschu, meaning *bodies*. The Mandschu *udju*, head, seems isolated; but in Turkish *üsz*, or *üz*, means the upper part of anything, as in *uz-re*, upon, above. The root of the Turkish *qul-aq*, ear, is found in the Finnish *caul-en*, I hear: Hungar. *halla-ni*, to hear. The Turkish *göz*, eye, is connected with the Mongolian *üze* (*üze-kü*), to see, from which the Mongolian forms the word *üzel*, sight, and the Turkish *güzel, beautiful, spectabilis*.

These instances have been adduced by Dr. Schott as indicative of the fact, that, when the same roots are not detected in different Scythian languages in corresponding terms for the same objects or ideas, they are often to be found in use in a somewhat modified sense, in several of these idioms. There is also a considerable number of words bearing precisely the same meaning, both radical and

derivative, which are either identical or very similar in the Turkish, Mongolian, and Mandschu languages. In some instances these words have been borrowed by one people from another. It is difficult to determine when this is the fact, and when they are a part of the original stock of vocables belonging to each language; but sometimes this may be done by noticing the form of such words, and whether their formative terminations belong to one idiom or to another; whether such words are in one dialect isolated and in another derivable from known roots, and associated with cognate words. When words nearly similar or identical exist in several languages, connected with ideas of the first necessity, we ought not, without proof, to conclude that they were derived by one people from another. Several examples illustrative of these remarks are cited in the work to which I refer. They afford additional evidence in support of the conclusion already suggested.

The preceding examples of analogy have been pointed out by Dr. Schott; they are few in number, but on comparing carefully the vocabularies of the Northern Asiatic languages given by Klaproth and others, I have found a correspondence equally decided, comprising a large proportion of words belonging to that class which Abel-Rémusat designates as terms of the first necessity. The collection is too long for insertion in these pages: I intend to avail myself of it on some future occasion. I must now give a few specimens of the interchanges of consonants and vowels, discovered by Dr. Schott in comparing the vocabularies of the High Asiatic languages, a subject which has been first elucidated by that writer. The following are some of the leading facts which he has observed:—

The final *n* in Mandschu nouns is frequently elided, and this is the only change produced in roots by grammatical construction: this consonant is in fact only a formal termination. *Morin*, horse, makes *mori-sa* in the plural. The Mongoles also omit *n*; as for *Khan-t*, plural of *Khan*, king, *Kcha-t*. Both these languages often drop the *n*, ad libitum, even without construction. Turkish nouns never drop *n*, grammatically or in construction, but often want *n* or *un*, in instances where the other languages have it as the usual ending. This syllable must therefore be cut off when we compare Turkish with Mongolian or Mantschu words. Examples:—

Mongolian,	kütz-ün	Turkish,	gütsch (strength).
,,	mesz-ün	,,	muz, buz (ice).
,,	toghoz-un	,,	toz (dust).

The Turkish avoids *n* at the beginning of words by omitting it or changing it into *j* or *d*,* as—

* *d* and *n* are interchangeable in the Celtic, *d* and *j* in many languages.

Mongolian,	neng	Turkish,	eng, (very).
„	nasz-un	„	jasz or jasch (age, period).
Mandschu,	nasz'ch-un (fortunate time).		
Mongolian,	nögür	Turkish,	ögür (amicus, consuetus).
Mandschu,	nadan	„	jadi, jedi (seven).

In the Hungarian or Magyar, *ny* takes the place of *d*.

*Mongolian, neile-kü / Hungarian, nyil-ni	to open.	Turkish,	del-mek (to bore a hole).
„	nyelv	„	dil, (tongue).
„	nyel-ni	„	dile-mek (to swallow).
„	negy (four)	Mandschu,	dechi (forty).
„	nyar	Turkish,	jaz for jar, (summer).
Compare Mongolian,	nar-an (sun).		
	nyol-ni	„	jal-maq (to lick).

The Turkish affects the medial or soft mutes and avoids aspirates and even tenues at the beginning of words. Thus it changes all labials, including *f* and *v*, into *b*; it drops *f* entirely in some instances.

The Mandschu, like the Chinese, avoids *r* by changing it for *l*. The Turkish often changes it into a soft and scarcely audible *z*. Examples of the above changes:—

Mandschu	falga	Turkish, barq (a race).
Mongolian	ghar	Mandschu, gala; Turkish, gol (hand).
Hungarian	tenger	Turkish, dengiz (sea).
„	nyar	„ jaz (summer).
„	ökür	„ öküz (ox).
„	terd	„ tiz (knee).
Mongolian	mörü	„ omuz (shoulder).
Mandschu, ara: Hungarian, ír		„ jaz (to write).

Words are in like manner disguised by the interchanges of gutturals and sibilants, and by the occasional omission of the former, phenomena which are observable in the dialects of most other languages.

The Turks and Mongoles change the hard *k* for a guttural *gh*, and the softer *k* for *g* and *j*. The Turkish final *k* or *q* is often a mere formative ending and is liable to be dropped: *qamuq*, Turkish, all, is in Osmanli *qamu*, in Mongolian *chamu*. The *maq* or *mek* of the infinitive in Turkish corresponds with *me* in Mandschu. *Gh* is dropped from the middle of words between two vowels, as *szighir*, a bullock, in Osmanli Turkish, becomes *szir* in Eastern Turkish, *schir* in Mongolian. So also *taghosz-un* (dropping also *un* as above) *toz*, Turkish; *chaghorai*, Mongolian, i. e. *chōrai*, in Turkish *qoru*, dry; *chabar*, Mongolian, a

* *Kü* in Mongolian, *ni* in Magyar, and *meq* in Turkish, are only the signs of the infinitive.

nose, dropping the initial guttural and changing the mute into its aspirate and adding a vowel, which the Mandschu requires uniformly at the end of words, becomes very near the Mandschu *oforo,* in Turkish *bur-un.* The common root is *var* or *vor; olcho-me* Mandschu, is *qorq-maq,* Turkish.

Omissions of the initial guttural and changes of *z* and *j* produce such differences as the following:—*göz,* eye, Turkish; *üzekü* (i. e. *üze*), Mongolian, to see; *üz-el,* sight, Mongolian; *güzel,* Turkish, spectabilis; *jasz-a,* Mandschu, an eye.

Mongolian,	zai	space, room	Turkish,	jai-maq (to extend).
,,	zacha	border	,,	jaqa.
,,	zali	flame, cunning	,,	jaling (flame) jalan (deceit).
,,	zekü-kü	to draw	,,	jük (a burden).
,,	dschimesz	barley	,,	jemisch.
,,	zol-gha-cho	to meet	,,	jol (a way).

Examples of the same interchange in other Turanian languages:—

Mandschu,	dsche-me	to eat	Turkish,	je-mek.
,,	dschulergi	before	,,	jileru or ilerü (ilergu).
,,	dschaman	quarrel	,,	jaman (bad).
,,	tschala-me	to err	,,	jalan (false).
,,	botscho	colour	,,	boja.
Hungarian,	szel	wind	,,	jel.
Mandschu,	dschuche	ice	,,	szouq (cold).
			Finnish,	jeg (ice).

By a similar comparison the author has shown that although the numerals differ considerably in all these languages, a sufficient analogy is discoverable between them to indicate an ancient though now obscure relation.

On comparing the phenomena traced in the preceding pages, it appears unquestionably to result that an extensive analogy of structure prevails through the four principal groups of languages compared—I mean the dialects belonging to the Turkish, the Mongolian, the Tungusian, and the Finnish, or Finno-Uralian families of languages, but I refer more particularly to the three former. They are all formed according to the same general laws. In the simplicity of their structure, and the want of real inflections, of which the place is supplied by juxta-position of particles, they approach in some degree to the character of the monosyllabic idioms spoken by nations who inhabit a contiguous region of the earth. They form a distinct class of languages, both from the Semitic, which inflects its dissyllabic roots and abounds in prepositions and conjunctions, and from the Indo-European idioms, which make so extensive a use both of inflection and composition,

which affect changes at the beginnings of words, and have their endings for the most part without addition. The languages of all these classes of nations last mentioned display the influence of that active fancy which peopled the universe with sentient souls, and ascribed life to all the objects of nature. Groves and fountains, rivers and trees, even stocks and stones, are in all their idioms either male or female. But the rude inhabitant of cold and arid steppes, rendered dull and phlegmatic by the monotonous aspect of nature and the changeless manner of his existence, gave no play to his imagination; he affixed different terms to his bulls, cows, his horses, and mares, and to creatures of which he made different uses, but all other objects were to him of one sex; he never compared inanimate with living things. It is, however, impossible to explain the common construction of the Turanian nations by reference to physical or moral circumstances; they display one type and method of formation; all question on this point seems to be silenced by the discovery of so many particular grammatical forms as we have traced through all of them, by their having the same pronouns, verbs substantive, and resembling particles. If we go still further back and examine the very structure of words, we find the inference confirmed; the law of harmonic vowels, found as far as I know in no other languages, shows that the inventors of words themselves had their attention directed to one principle, or were governed by a similar habit. Even the idiom or style in the composition of sentences sometimes displays similar analogies, and this was the fact which struck the attention of Scherer, and perhaps first suggested a further examination. Lastly, in the vocabulary itself, or the material of the several languages, there is a considerable extent of analogy; perhaps this would be thought of itself scarcely sufficient to lead us further than it led Klaproth and Abel-Rémusat, viz. to the opinion that frequent and ancient intercourse between the Mongolian, Tungusian, and Tartar tribes occasioned the adoption by each of common terms from the vocabulary of others. But such intercourse could only have produced an effect similar to that which the mixture of Normans and Saxons has effected in our own dialect; the adopted words would be distinguishable as entirely foreign; they would not be found naturalized by such interchanges of the particular elements of articulation as we have traced.

On the whole, there seems to be sufficient evidence to constitute the languages of Northern Asia as not only a particular class of human dialects, but as belonging to one great family of languages, of which the different members, though more remote from each other than the idioms of the Indo-European class, yet bear

and they are curiously contrasted with the African languages, traits that cannot be mistaken of a very ancient affinity. That the different nations who speak these languages, though they have been separated and scattered over interminable wildernesses from immemorial times, were yet allied in origin, or sprang from one primitive stock, is a further inference which it is difficult to avoid.

If we join the evidence thus deducible from a comparison of languages to the conclusion which historical testimony establishes respecting the original position of the Turkish race, and their early connection with nations of the remote East, we must give up entirely the notion that they were a Caucasian tribe, or nearly related in the first ages to the races of men who peopled Europe and the western parts of Asia. It has been observed, that while some Turkish nations, as the Russian Tartars and the Osmanli, have nearly the features of Europeans, other Turkish races display the type termed Mongolian. The latter are all the great nomadic races of Turkish extraction, in the central parts of Asia. The fact that the dialects of most of these nomadic nations are pure Turkish, without any considerable mixture of Mongolian words, strongly opposes the often-maintained opinion that their resemblance in features to the Mongoles has arisen from the blending of races, a supposition which the small numbers of the Mongoles at all times, in comparison of the great Turkish races, renders extremely improbable. This is not the proper place for a discussion of the question, to what other causes may be assigned such diversity in tribes descended from one race. I shall only remark, that it is not without parallel instances in the history of the Asiatic and European nations. The Finns and Lappes, for example, are allowed to be nations of one stock; yet they differ physically. The skull of the Lapp has the broad-faced Turanian form, while that of the Finn is entirely European, or of the type termed Caucasian.

IX.—*Notes on a Journey from Constantinople, by Heraclea, to Angora, in the Autumn of* 1838. By William Ainsworth, Esq., in charge of an expedition to Kurdistán.

Angora, 24th December, 1838.

In consequence of plague on board the steamer plying between Constantinople and Trebizond, and of the temporary interruption in the navigation of that part of the Black Sea, our party was reduced to the necessity of taking the land route through Anatolia, yet we still determined to fulfil as far as possible the instructions of the Geographical Society, as well as those of the Society for Promoting Christian Knowledge, who have so liberally supplied us with the means of travelling, to obtain a better acquaintance with the course of the Halys, and more particularly to explore the almost unknown districts between Ereglí and Angora. With these intentions, and in order to follow a less-beaten track, we endeavoured to procure horses for the purpose of proceeding by the site of the temple of Jupiter and the promontory of Kirpeh, to the mouth of the Sangarius, but the forests and the rocks on the sea-shore were declared by our guides to be impassable, and it was not till after we had arrived at Dúzchah that we were enabled to cross the mountains named Yáïlí Tágh, and reach the sea-coast, in the neighbourhood of the river of Uskúb.

Our party, consisting of Mr. Russell, Mr. Rasám, and myself, left Scútari on the morning of Tuesday, September 18th, 1838, and on the same evening reached Kartál, a village on the shores of the Sea of Mármora; passing on the road Mount Aïdós and the hills of Yakájik, composed of sandstone and superimposed limestone, and associated at Scútari with rocks of the felspatho-pyroxenic series. Kartál is surrounded by gardens, which supply the market of the capital with bámiyahs (hibiscus esculentus), tomatos (solanum lycopersicum), capsicums, onions, and other vegetables, besides grapes and peaches.

Sept. 19.—From Kartál to Pendík (Pantichium), a fishing village, chiefly inhabited by Greeks. Near it are the remains of a castle, in part constructed out of the ruins of a still more ancient edifice. Geïbúzeh (Geybúzeh), the ancient Dacibysa (?), is now a large village, with a handsome mosque, surrounded by cypress groves. It is built upon a hill, composed to the west of trap rocks, to the east of cretaceous limestones. At the khán or resting-place, a sarcophagus in white marble serves as a reservoir for water, and numerous other fragmentary remains denote the antiquity of the site. The cretaceous rocks constitute a hilly country, from hence to Tavshánjik, a pretty village surrounded by gardens and groves of cherry-trees or vineyards, which extend along the shores to Harakah, a khán and ferry to the opposite

side of the gulf of Astacus. The ruins of a castle upon an adjacent hill, and solid walls near the sea-side, attest an ancient site. The ferry on the gulf of Astacus existed in former times between Libyssa and Pronectus. Libyssa, in Rennell identified with Cshebissa (*i. e.*, Jebísah, a name not now known by the natives)*, is in Colonel Leake's map identified with Maldysem. At present there are two villages on the N. side of the gulf, from whence the passage across is made; the one Tavshánjik, the other Hárakah, which latter appears from this circumstance, and from its ruins, to be the ancient Libyssa.

Sept. 20.—The hilly country from Harakah, as far as to Izmíd,† is composed of sandstones and limestones. On this road a mound of crumbled ruins, an ancient cornice, and two columns, converted into a gateway, are all that remains of Brunga of the Jerusalem Itinerary. The road from Scútari (Uskudár) to Izmíd, where we arrived this evening, is now measured off as far as Itinerary distances are concerned; and painted posts are put up at every ¼ of an hour of a horse's walking pace, or about 3 miles to an hour. The distance from Kartál to Geïbúzeh is 20 posts or 5 hours; from Geïbúzeh to Harakah, 18 posts or 4½ hours, and from Harakah to Izmíd, 20 posts or 5 hours, making a total of 18½ hours or 55½ British miles, by the circuitous road, which is about the mean of the three ancient sets of Itinerary or 62 Roman miles, and not far from Rennell's deduction from the reports of seven different travellers compared with one another, which gave as a result 57 ordinary miles.

Sept. 21.—Nicomedia, so long a capital city, has been truly said to occupy a most imperial situation, both with respect to the scenery about it and its political and commercial advantages. Pliny the younger was prefect at Nicomedia, and the city of the kings of Bithynia was the residence of Diocletian and the historian. Its modern condition has been too often described to need any details here, but some travellers have almost denied the existence of any remains of ancient times, yet there is still a castellated building, and the tombstone carvers' yards are filled with fragments of antiquity. Lat. by two mer. alts. of the sun 40° 47′ 40″ N.; long. by chronometers, by three sets of altitudes, 29° 53′ 30″ E.

Sept. 22.—The country to the N. and N.E. of Izmíd, and between it and the Black Sea, is hilly and covered with wood, forming part of the forests designated by the Turks as the Agháj Denizí,‡ or Ocean of trees. It is said to be crossed in that di-

* Jebíseh is probably the Arabic name of Geybúzeh (pronounced Geïbizéh), and answers to the ancient Dacibyza.—F. S.

† Izmíd is a colloquial contraction for Iznikmíd (from Εἰς Νικομήδειαν).—F. S.

‡ Jihán numá, p. 666.—F. S.

rection by no great road, which information must be received with great caution, but the súrují's (muleteers) would not proceed in that line. The mountains of the sky (Gök Tágh), composed of limestone reposing on, and associated with, mica and chlorite schists, gneiss, and quartz, bound the Gulf of Astacus to the S., and extend eastward by Sabánjah to the Karám 'Alí Tágh, S. of Khandak 7 miles, and by the latter to the Bólí Tágh, S. of the plain of Dúzchah; constituting portions of the Bithynian Olympus; they are uniformly covered in their northern divisions with forests, with the exception of one culminating point, bearing S. 23° E. of Khandak, and rather in the rear of the Karám 'Alí Tágh, whose bare summit is said to expose the ruins of an old castle. The hills of Khandak unite Olympus with the southern ranges of hills named the Yaïlá Tágh,* and these are also covered with forest-trees from their northern acclivities to their abutments on the Black Sea.

The country at the head of the Gulf of Astacus and between the Gök Tágh and the southern hilly districts, is at first low and level, watered by the Kizil Irmák, and cultivated with rice and melons. Further inland are pastures diversified by hedges covered with wild vines, hops, and virgin's bower (clematis cirrhosa), the luxuriant creepers of these climates. On approaching the lake of Sabánjah, the northern and southern hills which enclose it prolong their rocky declivities into the plain, which is thus raised above its ordinary level, and is covered at first with a low and shrubby vegetation of evergreen oaks, &c., which soon, however, attain the magnitude and growth of forest trees. I have been thus minute in describing the features of this portion of Bithynia, because projects have often been made to construct a canal between that lake and the Gulf of Astacus. The younger Pliny, in a letter to the Emperor Trajan, proposed to convey a canal along this line, where he said there were already indications of a previous attempt to dig one; but there are at present no remains of such a canal. Plans for the same purpose, of the same nature, have been formed by the Turks in modern times; one in 1490 is noticed by Rennell. (Vol. ii. p. 104.)† Pliny reports that the difference of the levels between the lake Sophon (Sabánjah) and the Gulf of Nicomedia was 40 cubits, or about 60 feet, and the Turkish account is 30 lirás (cubits), also about 60 feet, and the lake was said to be 35 feet above the Sangarius.

The lake of Sabánjah, the ancient Sophon, is upwards of 8 miles in length, and of an oval form. At some seasons of the year it is said to overflow, and to pour its waters into the Gulf of

* Summer-quarters mountains.

† Others in 1505 and 1563 are mentioned by the Turkish historians Hammer, Reise nach Bressa, s. 171.—F. S.

Astacus; but there is a constant communication between it and the Sangarius by a rivulet called Killis. The lake has few pretensions to beauty, the hills to the north are low, there is little woodland, no villages, nor even any rocky scenery; but to the S. the woods are of noble growth and extent, and rise to the summits of the mountains, at least 1000 feet above the lake.

Sabánjah is a mere travelling station, full of coffee-houses and stables, of which the inhabitants vary every day, with about 500 houses and two mosques. The Greek Patriarch of Nicomedia claimed for this spot (which has now only a few broken columns and scattered fragments of ancient times) the name of Helenopolis. Colonel Leake marks it as Sophon, and Rennell as Lateæ, which latter in the Theodosian tables is placed 24 m. p. from Nicomedia, corresponding with the distance of Sabánjah from the same place.

Sept. 23.—The Theodosian or Peutingerian tables have a site marked as Demetriu or Demetrius, 13 m. p. from Lateæ. There are in the present day, at a corresponding distance from Sabánjah, the almost perfect remains of a handsome bridge of seven arches, 1087 feet in length, and carried over an old bed of the Sangarius, from which a small stream still finds its way along the same valley to the N. A plan of this bridge was accurately sketched by Mr. Russell; its name would appear to connect it with that of the son of Antigonus. As a remote proof that this was the old bed of the Sangarius, Mr. Rasám obtained from the natives a fragment of a tradition in verse, which relates that a dervish, or holy man, coming to the bridge, was required to pay, which he refused to do, alleging that his avocations forbade his carrying money about. The passage of the bridge was not however allowed, and in his anger the dervish prayed that God would change the bed of the river, that toll might not any longer be collected at the bridge; and it appears that his prayers were heard. The bridge is called by the people of the country Mahámah, and a road passing over it takes a southerly direction, being probably one of the Roman roads to Ancyra.

From the old bridge we proceeded to the modern one, a wooden structure carried over the river Saḳáriyyah, where it is 372 feet wide, with an average depth of 2 feet, and a rate of about 2 miles an hour. From the Saḳáriyyah, the road is carried over marshy land, which I knew by experience to be scarcely passable at some seasons of the year, but now tolerably dry: a wooden causeway, like an American corduroy, is carried for nearly a mile over this marsh. At a guard-house further on we found the residents suffering severely from malaria. Beyond this point the country improved, and low hills of trap-rocks led the way to the wooded hills of Khandaḳ, which we reached the same evening.

Sept. 24.—Khandak *is a posting village in the forest, and contains about 200 houses. For the supply of the post, Scútari has 100 horses, Sabánjah 150, and Khandak 200. There are few remains of antiquity, but occasionally fragments of columns and of hewn stones are seen, more particularly in the burial-ground of the town. Khandak is identified by Colonel Leake with Latania. There was much thunder and rain during this day.

Sept. 25.—Left Khandak by a circuitous route through forests of beech and oak growing upon rocks. After a ride of nearly 4 hours we came to the open plain of Dúzchah, remarkable for its picturesque beauty. It is itself very level, traversed in an irregular manner by the Mílán† river, which forms the lake of Ak-Tení Gölí,‡ in the S.E. corner of the plain. It is surrounded by wooded mountains, of which the Bólí Tágh, to the S., attains an elevation by trigonometrical admeasurement of 1490 feet above the plain, and the Yáïlá Tagh, to the N., is by barometer 1500 feet. To the W. are two openings with lower hills, and to the N. above Uskúb, vulgo Eskí Bágh, are some hills of minor elevation. The plain is everywhere verdant with green sward, trees, or shrubs; while the surrounding heights are covered from foot to summit with continuous forests, the different shades of which have a very pleasing effect; add to this that the whole is a plain of about 12 miles in length and 8 in width, which can be taken in at one view from almost any point, so as greatly to enhance the beauty of the scene.

In travelling from Dúzchah to Khandak, in 1837, the river of Mílán was forded nearly to the W.N.W., but at the present season, the river being flooded, we approached the lake, crossed a deep cut, with water scarcely moving, to the N.W., and banks clad with a deep and rank vegetation, while a little further was the river of Mílán flowing with a quick current to the S.E.; we kept along its banks half an hour to the N., then turned E. to Dúzchah: it rained hard during all the latter part of the journey.

The number of columns, cornices, and fragments of Byzantine architecture in the burial-ground appear as evidences of some former splendour in this small station, identified by geographers with Duseprum, a site without a history: one capital of a column, forming a head to a well near the khán, was ornamented with well-sculptured doves encircled by wreaths. At present Dúzchah contains scarcely more than 20 houses.

* A foss or ditch, in Arabic.—F. S.

† Mílán súï (Mílán water), Jihán-Numá, p. 650, takes its name from the Mílán, a rocky valley, where it rises (II. p. 647).—F. S.

‡ The Mílán river passes through the lake of Ifnáulú (J. N., p. 653), called Ifnán-lú-göl.

Sept. 26.—The town or village of Uskúb, vulgo Eskí Bágh, bore from Dúzchah N. 5° E. at the foot of the hills about 3 miles distant, but our route to it was, on account of the marshy character of the plain, very circuitous, and we had to ford the Mílán, flowing westwards. We found this place to have been once the site of a considerable town, part of which was contained within a strong circular wall round the hill, and still in tolerable preservation, while the remainder was *extra muros:* to the S. and upon the hill was also an aqueduct, but of a doubtful era. The modern village is for the most part within the old walls, and many of the streets are approached by narrow gateways, evidently belonging to an ancient style of building; the upper slab of one was 12 feet long and 8 by 3 in thickness.

We here copied several inscriptions: they appear to be only sepulchral. One inscription, however, was copied by Mr. Russell from a solid mass of stone, at a station where excavations had been carried on in some sort of outwork or temple: this appeared to have been the basis of a statue. Although no satisfactory evi-

ΑΝΤΙΝΩ
ΘΑΛΛΩΛ
ΚΛΑΡΙΣΗ
ΑΝΕΣΤΗΣΕ

dence could be obtained from these inscriptions, still the position of the town near the banks of the Hypius river and at the foot of the Mons Hypius (Yaïlá Ṭágh), will probably satisfy geographers of the identity of this site with the ancient Prusa ad Hypium. Rennell had already placed this city at a situation which he designates as Uskúb, from Eskúb, vulgarly called Bagh, as the district of Akchah Shehr is called *Uskúblí* Ḳazá-sí: this Uskúb is, however, on the banks of a lake at some distance from Duseprum.

On leaving Prusa ad Hypium we found further ruins in a very dilapidated state about a mile up the banks of a rivulet which flowed from the mountains higher up. This forest-clad chain we now approached, and began a long ascent, rendered the more difficult by the muddy state of the roads after the late rains. The forests consisted almost entirely of beech, with some oak and pine. The barometer at the summit level indicated a height of 1350 feet. The name of this chain, which extends to the E. almost uninterruptedly as far as to the 'Elḳás Ṭágh, has been variously written in the maps Tshila, Tcheleh, Tshele, and Chila.* The word Yaïlá or Yáïláḳ signifies summer quarters. This phrase, which is applicable to any mountain pasture at a considerable elevation, is very common in Asia Minor, and has

* Chileh ṭághí, the mountains of Chilah. J. N., p. 653.—F. S.

been consequently mistaken by modern geographers for a generic term for any chain of mountains.

It is very interesting while traversing the forests of Bithynia to observe in practice at the present day the very same usages as were noticed by Xenophon centuries ago, trees being still, as then, fired at their base and then felled, while small waggons yoked with male buffaloes came from the shore to carry away the wood. There are no villages, and the driver sleeps in his cloak every night till his work is done; and the carts are so constructed that their slope becomes excessive without causing any danger of an overthrow: the wood is used for ship-building, partly at Aḳchah Shehr and partly at Constantinople.

It had been some time dark before we began to ford the Uskúblí Ḳazá-sí cháï, which we did two or three times previous to reaching the port, without a harbour, designated as "Bay-stairs," Chuvállí Iskeleh-sí, and consisting of a long range of wooden houses with a beach, upon which, in fair weather, the small coasting vessels are drawn up. A mile beyond this to the W. we came to Aḳchah Shehr, called in the maps Aḳ Hissar, where we were detained some time by bad weather.

Sept. 27.—Aḳchah Shehr,* "money town" (or whitish city), is now but a poor village of about 20 houses, where they were building one brig at the time of our visit, and one small Greek boat from Várnah, loaded with dried beef, was drawn up upon the shore. Great quantities of *Momordica elaterium*† grew upon the beach, and the inhabitants, which is scarcely credible, were ignorant of the squirting power of the seed vessel. It rained hard with much wind also all this and the following day. The journey from Uskúb to Aḳchah Shehr occupied us 9 hours, travelling 27 miles by a circuitous route.

Sept. 29.—We took advantage of a momentary cessation of rain, after midday, to start along the coast, passing the river of Uskúblí Ḳáẓá-sí, 10 yards wide by 1 deep, but swollen, and doubtless a mere rivulet in spring, ascended a woody hill by a narrow pathway, where our horses stumbled and fell in the clayey soil; from thence we reached the valley of the Aḳ sú or white water, 13 yards wide by 1 deep. We stopped for the night at a poor village of 7 houses called Akóyah Köï, and corrupted from Aḳ Kayá Ḳöï, "the white cliff village."

Sept. 30.—Started early in the morning, cloudy with rain and strong wind from the N.; ascent, as usual, up a forest-clad hill, with steep and slippery clayey road, and much obstructed by branches and climbing plants. Forded the river of Ḳójamán, about 13 yards wide by 1 deep, but swollen; crossed a small

* Or Shár. J. N., p. 654.

† Squirting cucumber.

stream and kept along the shore of the Black Sea. The long-continued northerly winds had caused much more sea than usual at the foot of the cliffs, which, combined with the heavy swell, rendered the road at times almost impassable; and after an ineffectual attempt, attended with no little risk, to proceed along shore and also to pass over the cliffs, we were compelled to return to Ak kayá köï, where we remained the following day till the weather moderated: latitude by meridian altitude of sun 41° 4′ N.

The rocks in this district consist of limestone shales, argillaceous limestone in thin beds, and of altered rocks in nearly vertical or in curved and contorted strata. The chief varieties are iron-shot, calcareous, and argillaceo-calcareous beds; blue and black carburetted limestone shale with Lydian stone, veins of calcareous spar, and some clay iron ore.

After passing the summit of the Yallá Tágh an evident change takes place in the character of the vegetation; the underwood of brambles, briars, and fern, is replaced by rhododendrons, oleander, myrtle, box, and, in flower even at this late season, *daphne, vaccinium,* and cistus; nearer to the sea heaths and fern became abundant: the number of species of forest trees was considerable, and among them the chesnut was now frequent.

The Mariandyni possessed in ancient times the coast between the Sangarius and Heraclea, where the sea forms a deep bay terminated by the promontories of Kalpe or Kirpeh on one side, and that of Posideum, now Cape Bábá,* on the other. But if the country possessed the same characters as it does at the present day, which from other circumstances (for from the time of Xenophon to that of Jaubert, 1806, travellers have uniformly taken to sea at Eregli) appears likely to have been the case, the population and the productiveness of the soil could never have been great.

Oct. 2.—The weather being calm we started early. The Kó-jamán river had fallen half a foot since the preceding day; the next river, the Kókalá, offered no impediment, and early in the afternoon we arrived at 'Alábli, a port and fishing village with about 40 houses and a large government house, where we were received for the night. The Elæus is here a fine river, 17 yards wide and 1 deep, crossed by a wooden bridge, and increasing in width immediately below to upwards of 50 yards. Although 'Alábli has been identified with the ancient Elæum, we could find no remains here, save one fragment of a marble column at the governor's house. The hills throughout this day's journey were, as usual, covered with wood, in which variety and beauty were

* From the tomb of Hájí Bábá, a Turkish saint. J. N., p. 653.—F. S.

equally united; the rocks consisted of iron-shot trap and wacke, with altered rocks and limestone shales. On approaching 'Aláblí the country opened, and the prospect became more extensive; to the S. the high wooded mountains which form the continuation of the Yaïlá Tágh and bound the valley of Bólí to the N. terminate the view; to the E. a succession of hills and valleys rise up with the course of the Lycus as far as to the pine-clothed trachytic summits of the Kará Tágh; while to the N. the peninsula of the Posideum, with its lighthouse, and the walls and towers of Ereglí at the head of a calm bay, add to the variety and beauty of the scene.

Oct. 3.—As the Aghá could not provide us with horses, we took a boat to Ereglí, and starting early in the morning before the wind had got up, soon doubled the cape called Chingál Búrnú, composed of trap, limestone, and altered rocks; passed the mouth of the Kilij or sword river, the ancient Lycus, and arrived at Ereglí a little after 10, A.M.

It appears from our observations that there are no less than six rivers, besides numerous rivulets, between Akchah Shehr and Ereglí. The first, commencing from the W., is the Uskúblí Súï, or river of Prusias ad Hypium, and therefore the Hypius; but there is here a difficulty. In the plan of Dúz-chah we found the river of Prusias ad Hypium, known as the Mílán, and it is a considerable river flowing into the sea 3 hours W. of Akchah Shehr, while the modern river of Uskúb is little better than a rivulet. In the Theodosian tables and in Arrian's Periplus, after the Sangarius comes the Hypius (Mílán), and Rennell identifies Lilium with Chuvállí Iskeleh-sí. Probably the river of Prusias was the same as the Mílán; while the river now deriving its name from Uskúb is called so on account of its coming from the neighbourhood of that town and passing through its kádílik (Káza).*

Oct. 4.—Heraclea, now Ereglí, as the Pontic Heraclea, "has filled the page of history by its grandeur and misfortunes; and its remains testify its former importance."† The celebrated botanist, Tournefort, in his coasting voyage from Constantinople to Trebizond, *passed a night* here, and, according to Gibbon, "His eye surveyed the present state, his reading collected the antiquities of the city." We have the same authority for the

* Mr. Ainsworth here examines with some detail the names of places as given in the Theodosian tables and Arrian's Periplus; but, as he well observes, it requires a far more careful examination of all the points in question than he had time for, and a reference to books which a traveller could not be expected to have with him, in order to arrive at any satisfactory conclusion on the subject. His discussion is therefore omitted, but the original MS. may be referred to in the library of the Society by those who feel interested in the subject.—Ed.

† Rennell. Geo. of Western Asia, vol. ii. p. 115.

existence of a separate history of Heraclea in the fragments of Memnon preserved by Photius, and the authority of Rennell for a description of the same place by the Academician Beauchamp in the Mém. sur l'E'gypte, tom. ii.

Heraclea was the port where the fleet of the Goths awaited the return of the second expedition, that in the time of Galienus ravaged Bithynia and Mysia; but that that expedition should in its retreat have been attended by a long train of waggons laden with spoils, will appear doubtful to those who know the character of the country; and Gibbon has also been misled by Chardin when he asserts that to navigate the Euxine after the month of September is esteemed by the modern Turks the most unquestionable instance of folly. There were upwards of 30 craft in the harbour while we were there, and some going out or coming in almost daily.

Ereglí, or Bender Ereglí (the port of Ereglí), contracted into Bendereglí, as the Turks have named the ancient Heraclea, contains 250 houses of Mohammedans, and 50 of Greek Christians, who have one church. Having staid here 4 days, we had time to make a plan of the ancient town, and copied an inscription in the Acropolis. The walls are now in a ruinous condition, and constructed chiefly of the remains of a former rampart. In that part which fronts the sea, and where there are remains of an outer as well as an inner wall still existing, huge blocks of basalt and limestone are piled upon one another, and intermingled with columns and fragments of Byzantine cornices and tablets, with sculptured crosses and Christian inscriptions. The castle upon the height is in a very ruinous condition. Only part of the ancient town was contained within the wall; the outer portion, where we found mosaic pavements, extended in the form of a triangle to a valley with a rivulet, now called Gaúr Irmák, and formerly a harbour, defended by towers, the ruins of which still exist. Was this the Metroum?—Of the Acherusian peninsula we could find no traces; it might have been a point where is now the inefficient Pharos of the Turks, a spot where a few villages are exempted from taxes upon the responsibility of keeping a light burning before mirrors darkened with accumulated soot.

The latitude of Ereglí by mean of three meridian altitudes of the sun we found to be 41° 15′ 30″ N.; its long., by mean of several observations, 31° 30′ E.*; variation of compass, 9° westerly; we observed also for dip and magnetic intensity.

The formations around Ereglí consist of igneous and sedimentary rocks. The first exhibit themselves chiefly at Chísh Depeh and Cape Bábá, but also form the bases of the Heraclean rocks.

* Gaultier places the lighthouse in long. 31° 24′ 56″ E. of Greenwich.

They consist of basalts, dolerites, trap, and trap-conglomerate. The latter more particularly forms the foundation upon which the wall of Eregli rests, and many of the huge stones which enter into its construction are formed of the same coarse material. To the S.W. of the town is a hill composed of argillaceous limestones of a pink yellow and yellowish-white colours. The pink variety is compact, fissile, and was much used as a building stone in the old city. To the north, and at the foot of the Acropolis, is a fountain of coarse gritty sandstone, very friable and passing, on the one hand, into a conglomerate, and on the other, into coarse limestone. It is shelly, and remarkable for containing littoral genera, such as patellum and astrea, and zoophytes of a similar character.

There is a general remark which might be ventured here, that it is impossible for the traveller to wander along the shores of the Black Sea without being struck with the rarity of shells common to the Mediterranean shores, as species of turbo, buccinum, purpura, solen, and mactra, replaced here by an occasional tellina, venus, or cardium, and the frequent occurrence of naïades belonging to the genus anodonta, while its waters abound in tunny and other sea-fish. In the gradual diminution in saltness which takes place in a Mediterranean sea like the Euxine, where the supply of fresh water is large and the waters of the sea itself as constantly going out, it would be curious in a geological point of view to ascertain whether the first forms of animal life affected by this new order of circumstances, be those which belong to the lower orders in the scale of creation? or whether their diminution in numbers be also indicative of a similar destruction of larger forms that haunt the deep waters?

Oct. 8.—We now turned our steps in an easterly direction up the course of the Lycus, and proceeded over low hills of sandstone and ironstone, by a road, part of which was paved with slabs from 2 ft. to 8 ft. in length, and from 1 ft. to 2 ft. in width. About 5½ miles from Eregli we found on the roadside, and crowning an eminence, an old tomb of an oblong form built of large massive stones, and hollow within. It is called Kóchák Tásh, "the hero's stone." Three miles beyond this, we came to where the Lycus forced its way through rocks of sandstone in thick strata, dipping north, and rising with rounded but nearly vertical walls, over which fail numerous streamlets of water from the well-wooded hills above. Immediately beyond the pass, a large mass of rock 90 ft. high, now overgrown with wood, except on its most precipitous parts, has become an island, and in the centre of the stream it forms a singular and picturesque object. It began to rain in the evening, and we only reached the valley of Yálchílar (masons), about 12 miles from Eregli, not far from which, in the forest to

the N., are some cliffs apparently with hewn sepulchral caverns, now called Bál Kayá sí (honey-cliff), but which the bad weather prevented us from visiting.

Oct. 9.—It rained in torrents all night, and the Kilij rose nearly 4 ft., overflowing great part of the plain, and assuming the appearance of a small lake, covered with trunks of trees and wood of various kinds. The pass of Bárakátlar (Blessings), so passable on the previous evening, was rendered totally impracticable. It is evidently from these rapid and very sudden risings that this river obtained the name of Lycus, from its resemblance to a wolf rushing upon the fold.

We started near midday during a momentary cessation of rain, but were soon turned out of our path by the swollen river, and obliged to ascend the hill. After an hour's journey through a picturesque country we arrived at a point where the Lycus was crossed by a bridge, and made a sudden bend from the N.E., receiving a considerable tributary from the S. The two rivers met below cliffs of trap and sandstone.

We soon arrived at the foot of hills consisting of trap and trap-conglomerate supporting coloured limestone, which a rivulet flowing from above had covered with a deep coating of travertino. After continuing our ascent 20 minutes we came to a village named Yáïlar, "summer-quarters," from whence we had a fine view of the Lycus flowing at first through a rocky country; and then through a fertile valley, from E. and W., and backed by the limestone hills of Ovah Tághí (plain mount), partly wooded and partly white rocky cliffs. To the S. the country consisted of alternate valleys and rounded hills, on one of which a spot was pointed out said to contain an old iron-mine. On this hill the barometer indicated an elevation of 840 ft. We continued along its crest for a short time, skirted round a hill, and came down upon the Lycus, on the banks of which we found a village of four houses, one of which was empty, and in it we found a refuge from the rain that poured down all night.

The country we had hitherto been travelling through consisted of more or less round and irregularly formed and scattered hills. It was almost impossible to reduce them to any system of arrangement: sometimes hard limestone or sandstone gave birth to cliffs, more or less picturesque, from their wooded knolls or steep bare acclivities; at other times, rounded summits commanded on all sides valleys containing villages and cultivated lands, or deep ravines with streams rolling swiftly below. The hills were sometimes, but very rarely, conical, and the serrated outline of the Kará Tágh generally backed the view: its summits were sharp and sometimes pointed, numerous and narrow, following one another in quick succession, nearly of the same height, and everywhere covered with dark forests of pine.

At this season of the year a large portion of the arable land is occupied by crops of flax which, now young and verdant, are allowed to be all winter protected by the snow. Maize and millet were yet in great part in the fields, cut, but not carried home. The garden-crops consisted of gourds and cabbages.

Oct. 10.—Our road to-day lay up the valley of the Lycus, which we first crossed upon a wooden bridge, above which are the remains of an older construction built of stone, and a little beyond it the river receives a tributary from the S.W., considerable when compared with the Lycus itself.

The path we followed was carried along the acclivities of wooded hills, of limestone, cretaceous marls, and sandstone, with trap-rocks and occasional dykes of basalt crossing from S.E. to N.W. The road wound round the acclivities and base of these hills from E. to N.E. At a distance of about 5 miles up the valley the Lycus receives another tributary, equal to almost half the body of its waters, from the S.E. Above the point of junction one of the Ḳará Ṭágh mountains rises like an isolated peak to a height of 900 ft. above the river. Six miles beyond this a river is met with flowing from the N., with a bridge and small khán, and receiving another tributary from the E.

Our ascent of the Ḳará Ṭágh began at this point, and lasted nearly an hour, when we attained its summit, near the village of Ḳará-bínár* (Black Source.) The barometer indicated an elevation of 1500 feet, and the mountains around did not rise much more than 500 feet above this point. The view now spread out before us carried the eye down the Ḳará Dereh (Black Valley), over a hilly country to the basis of the Filiyás and Bártán rivers; and was bounded to the N.E. and E. by the lofty and bold rocky summits of the Ḳayá Dibbah (N. 55 E.), and the more tame and wooded outline of the I'ch-íl-ler Ṭághí. Ruins of a castle (?) are met with in the mountains to the N.

We descended the valley of Ḳará Dereh, and turned to the southward to Básh Burgház, a small village at the foot of Mount Ipsil,† a spur of the Ḳará Ṭágh, where we were to obtain a change of horses.

Oct. 11.—Although it had rained all the previous evening, we were enabled in the morning to obtain some lunar distances and altitudes of the sun before we started. Our road lay along the valley of the Ḳará Dereh, the waters of which flow eastward; the Ḳará Ṭágh forming the culminating ridge between the basin of the Lycus and that of the Billæus. Before mid-day we left the rivulet, at an assemblage of uninhabited buildings called Beg

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* Pronounced Bunár; originally, no doubt, Bínár, and by the eastern Turks Buñár—ñ in the French, ñ in *en*, *mon*, &c.—F. S.

† Ipsilítágh, from the Greek Hypsile?—F. S.

júm'ah-sí* (Bey's Friday market), and used as a market-place on Friday, the Mohammedan sabbath, for the two kádíliks or districts of Básh Burgház and Pershembah.† Hence we ascended N.E. to the chief place of the latter district, a rather showy place at a distance from its whitewashed mosque and large aghá's house, but scarcely containing 30 dwelling-houses. A meridian altitude of the sun gave the latitude of this place 41°. 19′ N. Bar. 28·980 inch., att. ther. 62° Fahr. The country consisted of sandstone and limestone alternating in thin beds, and was covered with underwood, chiefly deciduous oaks and juniper. 5 miles beyond it we descended into a deep valley, with a rivulet flowing S., called Tursehgí Dereh-si. Our ascent was up an acclivity, amid traprocks and limestone; we then passed through a wood, and near two or three villages, when we came to the open valley of 'Abd-allah Páshá Dereh-si, so called from a mosque bearing the same name, placed in an insulated position on the S. side of the valley, at its termination above the Filiyás. This valley receives all the waters of Kará Dereh, and the Pershembah district, to pour them into the Filiyás, which is here a fine river, divided into five different streams separated by islands of pebbles, occasionally covered with plane, sycamore, tamarisk, and oleander, but sometimes stony and naked; the occasional floods of this river, to judge from its bed, upwards of a ¼ of a mile in width, must be very great, but it is soon confined in one channel; and at Tium, where it empties itself into the sea, though deep, is only about 100 yards wide.

The beautiful valley of the Billæus was crowded with villages, and the views on every side varied and extensive. The river is seen flowing N.N.E., in nearly a straight line, apparently from the very foot of the dark and frowning Yaïlá Tágh. To the E. is a hilly country, either cultivated or covered with wood, and interspersed with villages belonging to a second Pershembah district, where the plague had been raging but a short time before our arrival, while our road lay down the river N. 30 E. to *Chárshembah*,‡ the chief place of another Kádílik or jurisdiction, where we slept and changed horses.

Our attention was now directed towards the ancient sites on the banks of the Billæus, and every inquiry was made regarding the existence of ruins, &c.

Ptolemy has placed a city called Claudiopolis, and also Bithynium, on the river Elatas, which has been by some supposed to be either the river of Elæum or the Lycus, but Rennell and

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* Beg jum'ah-si bázárí.—F. S.

† For Penj-shenbeh, *i. e.* Thursday, put for Penj-shenbeh bázárí, Thursday's market.—F. S.

‡ Chár for Chehárshenbeh, Wednesday, *i. e.* Wednesday's market, an elliptical expression.—F. S.

D'Anville both agree in supposing this city to have stood on the Billæus, and Elæus or Elatas is substituted for it. From the exploration now made of the Lycus, which we had followed up to its source, we were convinced of the non-existence of any site of importance upon that river. We had crossed the Elæus (?) at 'Aláblí, and heard of no ruins up that river; and we now approached the Billæus at some distance from its embouchure, and to which point we directed our researches, having heard of no remains higher up the river.

There remained for us, besides Bithynium of Ptolemy and Strabo, Mantinium, and Tium or Tios, in the country of the Caucones, who succeeded the Mariandyni, occupying both shores of the lower course of the Billæus river. Of Tium Rennell says it is now represented by Filiyás, which is also the corrupt modern name of the Billæus, "but we hear of no remains of Tium."

Oct. 12.—After taking morning sights for me, we started, passing over a plain covered with sycamore and tamarisk, the river being enclosed between low ranges of wooded hills of limestone and marl, with every here and there a village peeping from among the trees. Hemp is much cultivated on the islands of the river, and on its banks. At a distance of about 3½ miles we forded a large rivulet, 7 yards wide by ½ a yard deep, called Dagermánós Dereh-sí,* with some small villages and one large one, Chamánlí Kóï, of about 40 houses, on the hill-side. A little beyond this, at a point where the river, after making a long bend, approaches the hills on its left bank, is a small village called Chái Kóï, built in part upon a mound of ruins, where there are several large hewn stones, which make it not unlikely that this was the site of a guard-house or small military station. Beyond this, at Aḳ-bunár, we obtained a meridian altitude of the sun, which gave our latitude 41° 29′ N.

At Gölmekchí-ler (Pottersville), a village of 30 houses, on a low hill, by the river-side, and about 2½ miles beyond Aḳ-bunár (the white spring), we found many fragments of large hewn stones and marble columns, with distinct remains of an ancient causeway.

A short distance beyond this a mass of basaltic rocks, having a tendency to the prismatic structure, advances to the border of the river on the left, narrowing its bed considerably, and forming a kind of defile. Here are the remains of an old gateway, and a little beyond them a mound of ruins, overgrown with underwood, which may have belonged to a guard-house.

Beyond this was a noble plane-tree which measured 8 yards

* Degirmán Dereh-ṣí, Mill-valley ?—F.S.

round its trunk, at a height of 12 yards from the ground; but still more remarkable for its fine and symmetrical form than for its dimensions. Its branches spread nearly equal in all directions, as it towered to a height of upwards of 60 feet.

The river, winding round about 2 miles, to the N.E., turns suddenly to the W. before reaching the sea, and sweeps round the foot of a hill, which bears a considerable structure of various ages, and which announces itself as the castle of Tïum.

There were several vessels of small burthen in the river, and a modern village designated as Saferjí O'ghlá. Crossing over the hill, we passed by an ancient gateway and entered upon the picturesque ruins of Tium, beyond which, after passing a fine village, Beglaruń Kói, we came to a second, Hisár-Ańlú, the village attached to the castle, the residence of an 'Ayyán, who found us a home for the night.

Oct. 13.—We walked the previous evening to the site of Tium, by an ancient causeway, hedged in on both sides by bays, probably sprung from olden roots, as the road from Antioch to Daphne is in part similarly ornamented; yet such plantations are rare among the Mohammedans. Passing over the walls, we found pillars and fragments of ruins rising here and there, but everything was covered with a dense and almost impenetrable shrubbery. The evening was occupied in measuring and sketching a beautiful ivy and shrub-clad ruin, that appeared to have been a church or a basilica. The next day we began our labours at a less picturesque edifice, probably a guard-house, with two stone platforms, descending into the town; beyond, and nearer to the centre, were a few arches belonging to an aqueduct; from this point we visited a mound where were some curious ruins, and numerous sarcophagi, the lids of which were of large dimensions, and cut in solid stone, but the coffins were made merely of fragments of pink slaty limestone.

The next object of interest was a small but very perfect amphitheatre, now buried amid trees and shrubbery; and from this we went to the castle, which we found to be the most altered and rebuilt, and consequently the least interesting of all the ruins. We met with no inscriptions, but transmit the details of our researches, which are only of a general nature.

About midday we were ferried over the Filiyás, the day being very warm, therm. in shade 72°, and the temperature of the water only 50°. Our road at first lay along a level plain of alluvium, formed by the river; and we were once turned back by some deep marshes, beyond which we entered a thick forest, and began to ascend along acclivities composed of trap-rocks and limestones. We were now in the district of Kól Bazár, but there were few villages; and in the evening, after travelling

about 10½ miles, we arrived at Ḳisil Elmah, the residence of the 'Ayyán, in a pretty valley which extended northwards about 3 miles to the sea-shore. The 'Ayyán was captain of a merchant-vessel trading between Bárṭán and Constantinople, and being an intelligent man, I have ventured to insert on the map the details which he gave to us of the coast-line from Cape Bábá eastward to Amáṣerah.

Oct. 14.—We could not stop the Sunday in the crowded residence of the 'Ayyán, so continued our journey, which was a short one, over the same kind of country, low, hilly, and wooded, but with a few more villages, for about 9 miles, when we came to the crest of some chalk-hills, from which a picturesque view was obtained of the river and modern town of Bárṭán, like most Oriental cities, looking best at a distance.

In the calcareous limestones of these hills we found remains of marine algæ, but no shells. An abundant spring which issued from the same formations indicated a temperature of 57°, the air in the shade being 79°. We had still a marshy plain, impassable on foot, to ride over before we got into the town, where we were lodged in the Khán.

Oct. 15.—Bárṭán, a town little visited by Europeans, is situated in lat. 41° 36',* as determined by a mer. alt. of the sun. It is built at the junction of two rivers, the Ḳójahnás, from a village of the same name, and near which it is said to have its sources, and the O'rdeïrí, which flows from the foot of the Durnah Yaïlásí, in the district of Za'farán Bolí. When the two rivers unite they are called the Ṣú Cháṭí. The Kójahnás Armak flows through a deep bed in alluvial soil, being liable to an occasional rise of from 8 to 10 feet. Its depth at the present moment averaged from 6 to 8 feet; its width was 28 yards, and its rate 2½ miles an hour. The O'rdeïrí exceeds the Kójahnás in width, being about 30 yards across, but is neither so deep nor so rapid. There is one stone bridge over the Kójahnás, and a wooden one replaces another that existed formerly on the same river at the N.W. end of the town. The communication over the O'rdeïrí is kept up by means of a ferry, but there are also remains of a stone bridge. There were numerous vessels building at Bárṭán, some of which were of upwards of 100 tons burthen, but the port is 2 miles below the town, which is 4 miles from the sea by the river, and 3 by land.

The town of Bárṭán has 650 houses, out of which there are eight houses of Christians, who have no church. The Mohammedans have five mosques. The houses, on account of the marshy character of the surrounding country, are all built of two stories, the

* Gaultier says, 41° 33' 52" N., 33° 14' 8" E. of Greenwich.

upper one of which is alone inhabited. For the same reasons, the town is carefully paved with large limestone slabs, better so than any Turkish town we had yet seen; and some of us were doubtful if the pavement did not belong to a period anterior to the Mohammedans, but remains of antiquity are too scarce at Bártán to certify as to its being an ancient site.

The town is built upon two low hills of cretaceous limestone dipping S.E. at an angle of 20°. The houses also extend into the valley between these hills, which rise S.E. and N.W. of each other, and stretch to the banks of the Kójahnás on the one side, and to those of the O'rdeïrí on the other, rising up the hill-side to the N. or beyond the latter river. Strabo says the Parthenius rises in Paphlagonia, and derives its name from the cheerful meadows through which it flows. The Parthenius is generally considered the same as the Bártán river.

Oct. 16.—Leaving our baggage at Bártán, we hired horses to take us to Amáseráh (4 hours) and back again the same day. We crossed the O'rdeïrí, and soon afterwards turned up a narrow valley with a small tributary to the former, designated as the Kará Chái, or black river. The valley soon narrowed, and was nearly blocked up by sandstone cliffs, which often presented a rude outline with fantastic forms, and in one place a rocking stone is curiously perched upon a pinnacle of the same rock. We now commenced the ascent of wooded hills, the road a bad one, and continued along these till we came within view of the sea, when we turned to the E., by a steep descent, with steps hewn out of the solid rock. It would have required little, in a country where so little public spirit in the way of internal improvement exists as in Asiatic Turkey, to have determined that this road had been executed by another nation of workmen, but it was not long before we came to a small niche in the rock, destined to hold apparently a figure, and beyond was a tablet containing an inscription in Latin, of which we could only make out a few words, as PROTAGE NORENTI CLAUDI GERMANICI * * *. A little beyond this is a tablet basement, supporting an arched frame-work, with the upright figure of a Roman in his toga, much mutilated and the head broken off, but the attitude is graceful and the detail good. Close by was a column and pedestal cut in solid rock, and supporting a colossal eagle, of which the head had also been struck off. There were also two tablets, of which the inscriptions were quite illegible. The column was 12 feet high, the statue of natural size. The base of the frame was 7 feet wide, the height 12. The base of the column was 3 feet wide, the height 12 feet, and the eagle was 4 feet 6 inches in height.

Further on, on the road side, was a semi-circular arch, formed of one ring of solid masonry, 14 feet wide by 7 high, and running

back 15 feet; ½ a mile further, upon an elevated site, probably visible at sea, were the remains of an oblong monument, apparently a mausoleum, near which was the lid of a large sarcophagus.

The road now led circuitously down a steep hill towards Amáṣerah, which, like most modern Turkish towns that occupy ancient sites, is picturesquely situated. The town, which consists of 145 houses, and has a population of about 800 persons, is built upon a rocky peninsula that has two necks, the first formed by a minor and greater bay of the sea; the second by a small inlet, over which a narrow causeway led to what was formerly the castellated or military portion of the town. Rude and nearly perpendicular rocks form the cape called Díwán Búrní, which rises above the little bay to the S.W., and the whole of which was formerly built in with large stone blocks, like a well-kept harbour. The bay to the E. is wide and capacious, and beyond the town there is a rocky mass, forming (apparently always) an untenanted island; and to the E. a lesser rock is connected with the mainland by a wall in a ruinous and dilapidated condition. The whole of that part of the ancient and modern town which occupies the peninsula was surrounded by a wall defended by towers, which appear to have been renewed at various times, but to have received their chief regeneration from the Genoese, whose Christian escutcheons are over every gateway, and whose ornamental taste in architecture has here and there interwoven Gothic tracery and Byzantine wreaths amid the solid blocks of Roman perpetuity; and even eagles, sculptured on white marble, are seen prostrate at the angles or corners of walls which they once adorned. The town overlooks the sea to the N., but its greatest extent fronts the interior or the S.; and there extends before it and in the same direction a well-wooded and picturesque valley, which is replete with ruins of various character. One of the most extensive of these is a large building of red tiles, supporting in an unscientific manner huge blocks of stone, and cut up by numerous irregularly-disposed and irregularly-formed arches. This place is called Badistán by the natives: it was approached by a handsome gateway with a semi-circular arch, and appears to have been a monastery. At the foot of the mountains to the W. is a fragment of wall with two tiers of arches, which perhaps belonged to an aqueduct. On the hill-side are other ruins, overgrown with shrubbery, amid which they were just discernible, while a more distinct arch stood prominent, high up on the hill-side, and assisted in filling up a picture such as lesser Asia is almost unrivalled in producing, and in which monuments of by-gone times, belonging to such varied epochs and people, are gathered together in the same little centre of unchanging natural beauty.

We are now about to quit Bithynia, and, crossing the Parthenius, to enter upon the no less interesting districts of Paphlagonia, but before doing so we may be allowed one or two general remarks.

First, it is worthy of notice that, in all the contacts that were observed between the cretaceous or supracretaceous limestones and the igneous rocks in Bithynia, only two orders of modifications induced upon the original aspect of the rock were common,—the one into a compact limestone that was not granular, and the other, and by far the most common, was into a slaty pink-coloured rock, indicating a large evolution of gaseous matters at the period of the effusion of the igneous rocks, without any very considerable heat. This peculiar red colouration of portions or zones of stratified rocks has already been attributed by some geologists to an impregnation derived from igneous sources, as in the case of the red schists of some of the Swiss cantons, which have appeared to be derived from the prolongation of a metallic or plutonic vein (Boué, vol. i. p. 484). And the origin of the same bands of red limestone in the Alps has been placed in the same category by Studeo. In the Bithynian chalk and supracretaceous limestones it is only where that formation is in contact with or in proximity to igneous action (which is always made sufficiently evident by the flexuous and contorted or variously dipping strata) that the same phenomena are observed.

Secondly, an instructive comparison may be made between the sedimentary formations of Bithynia and those of Paphlagonia. It would appear that the limestones of the first country, from their uniform mineralogical characters when unaltered by contact with volcanic rocks, and the continued absence of organic remains, excepting a few marine algæ, had been originally formed in the deep sea; while the ostracite sandstones and highly fossiliferous limestones of Paphlagonia have evidently had a littoral origin.

This view of the subject would put the Nicomedian peninsula and a large portion of Bithynia at one period in submarine depths, which were limited to the S. by the Olympus, which at the same time bounded to the N. the central lacustrine deposit of Asia Minor described by Mr. W. I. Hamilton as bounded to the S. by the western prolongation of Taurus, and upon the south-eastern acclivities of which we have traced the same littoral formations of the supracretaceous epochs, succeeded in Northern Syria by deep sea and non-fossiliferous rocks, apparently of the same epoch as the Bithynian deposits.

Lastly, although the country we had traversed from Akchah Shehr to the Parthenius was everywhere hilly, and sometimes mountainous, still the country of littoral mountains could always be distinguished from the more southerly and lofty chain of

Olympus, which, although broken into different parts, and known by various names, is still always distinguishable from the lateral parallel and transverse chains which give origin to the numerous small streams that flow into the sea, or form tributaries to the greater rivers, as the Sangarius, the Lycus, the Billæus, and the Parthenius.

From this great E. and W. chain, others apparently start at nearly right angles, and approach the shore from S. to N., but this would be an incorrect way of expressing the fact, for these are distinct systems of mountains, having a different origin and structure, generally plutonic, and bearing up on their flanks the broken and tilted-up fragments of those sedimentary deposits which enter into the composition of the round and irregular hilly districts of Bithynia. Such, more particularly, is the case on the hilly chains of Ḳójamán and of Ḳará Ṭágh and Ipsil, with their trachytic cones and outlying basaltic dykes; and of similar nature are three distinct ranges of hills, which advance in as many different promontories into the sea, between the embouchure of the Filiyás and that of the Bártán river, formed of a nucleus of rocks of the felspatho-pyroxenic series, succeeded by trachytes near Amáserah, and having between them an irregular forest-clad and hilly country composed of rude sandstones, altered limestones, and limestone shales, the valleys of which, when filled with detritus or alluvium, are almost alone subject to cultivation.

Oct. 18.—We left Bártán and pursued our journey up the course of the O'rdeïrí in a south-easterly direction. A rugged and mountainous district, that of the Ḳayá Dibbah (hollow rock), lay to our left, as it had to our right in going to Amáserah. In this little alpine and picturesque district a total difference is observed from the generally tame outline of the Olympus, and of the transverse chains of Bithynia. The same craggy steeps extend by the Ḳará Ḳayá, or black rock, another lofty limestone precipice, as far as to the sources of the O'rdeïrí, in a south-easterly direction; but more to the S. they are united to the Paphlagonian Olympus by mountains which are less lofty, with a rounded outline and wooded acclivities, named the I'ch-íl-ler Ṭághí, and which attain by trigonometrical measurement an elevation of 1966 feet above the lower plain of the O'rdeïrí.

The O'rdeïrí forces its way through a pass in the I'ch-íl-ler Ṭághí, which we reached in 4½ hours by a winding route, after fording the river three times.

At the entrance of the pass two lofty mountains rose to the right and left, clad to the very summit with forest-trees of varied and beautiful verdure, while the river, now a mountain-torrent, rolled over a stony bed below. This pass opened into a pretty but uninhabited plain, and then again narrowed, the road being

carried amid huge masses of sandstone and conglomerate, overshadowed by laurel, ivy, box, myrtle, oleander, and other evergreen and deciduous shrubs. After passing beyond this, through a forest of birch, we forded the river, and came amid plane and some pine, the seeds of which had been brought down by the torrents, to where the O'rdeïrí received a tributary from a portion of the Kayá Dibbah, to the N., while we followed the south-easterly branch, and at a short distance reached a poor hamlet called Sarnísh, in the 'Ayyánlik of Oluz.

Oct. 19.—There was no possibility of getting the requisite number of horses at Sarnísh, so we mounted the few wretched animals that could be obtained, and put the luggage into waggons drawn by buffaloes. At about an hour's travel we came to a mosque in the forest where the neighbouring villagers had collected for prayer, and were at the same time roasting two whole sheep, to feast upon after service. Crossing the river at this point, we commenced a long ascent through a forest on the hill-side, the road being made of logs of wood laid transversely. The lofty precipice of limestone called the Black Rock opened upon us to the N.E., and a tributary of the O'rdeïrí came through a rocky pass near its base. The barometer indicated for the height of the crest we were passing over about 900 feet.

Descending again into the well-wooded valley of the head-waters of the Ordeïrí, we passed several good saw-mills, more especially on approaching Dúrsán-lí, a village in a valley to the S., and the residence of the 'Ayyán of Ováh or Ováh Kaza sí. Dúrsán-li is corrupted from Dórt Hasanli—the four of Hasan.

Oct. 20.—Our road still lay towards the sources of the O'rdeïrí, and after a short journey through woods of plane and cork, with underwood and coarse grasses, we passed the mosque and villages of Bágh Jeviz,* which extends far up a valley to the N.; while our route lay along a more expansive and wooded vale to the S.E. Everything was upon a large scale, and truly alpine: at the head of this valley was the mountain of Durnah Yáïlá-sí, with a forest of pine fringing its rude acclivities, but with a bald summit above all: to the S., wild crags and precipices, the home of the mountain antelope and the ibex, alternated with dark woody recesses, that appeared almost unattainable. There was here and there a village in the bottom of the valley, and a few houses (more indeed than might have been expected in so secluded a spot) were scattered upon the summit and acclivities of the hills to the N. These hamlets were tenanted by a race of a very dark and swarthy hue, with uncombed hair and a neglected appearance. The rocks in the neighbourhood consisted of sandstone and sandstone

* Walnut-Garden.

conglomerates, passing into millstone grit, and associated with limestones, limestone conglomerate, and limestone shales. It took us exactly 4 hours and 40 minutes from the time we left Dúr Sanlí to gain the crest of the watershed of the O'rdeïrí. The two barometers indicated for this point an elevation of 3200 feet; but, although we had been always ascending since we left Bártán, it was very different with the country now before us, which, forming the two Iflánís, and named by Rennell, after an Oriental authority, "the stony Ifláni," extended to the E. in an elevated and continuous moorland.

The great features of the new country we had now entered upon consisted, first, in the high range of mountains which began at the Durnah Yáïlá-sí, and extended to the S. as far as the culminating point of the Sarkhún Yáïlá-sí, now covered with snow. This range is identical with the Mons Orminius of the ancients.

N.E. of this was the great upland of Iflání, or central Paphlagonia, which is formed of supracretaceous rocks. In advancing towards the S. this upland and the stratified rocks of which it is composed begin to be broken up by water-courses and ravines. When once the upper crust is broken, a softer and more friable material beneath is carried away with rapidity till it meets with another hard bed: at the head of the lateral valleys there is thus only one rock-terrace above the rivulet-beds; but, in descending (as is generally the case), the number of these rock-terraces increases, while, at the same time, the valleys widen, till, pretty nearly at the same point, namely, on arriving at the valley of the Sóghánlí Sú, the table-land, which has gradually diminished in elevation, terminates in rounded headlands between different rivulets. Beyond the same river, a vast pile of horizontally-stratified deposits, named Kází Yáchí (Goose's neck), towers above the river to a height of at least 1000 feet. This is no mountain mass, but a portion of the same upland, denuded by various causes, more particularly the action of torrents, and is found to be upon the same level as the plain of Iflani, although to a spectator in the valley of the Sóghánlí Sú it appears as a distinct mountain height.

It was here, and at an elevation of upwards of 3000 feet above the sea, that we first met with almost continuous beds of large oysters, and in the limestones below cones and spiral univalves, generally of a gigantic size. The whole of the rocks around Za'farán Bólí are redolent with fossil remains, and some beds are composed entirely of nummulites.

The same evening we arrived at Za'farán Bólí, and were glad to enjoy the repose which the sabbath offered to us in the quarter of the Greek Christians, which is called Kurán Koï.

Za'farán Bólí, a town almost unknown to Europeans, is built at

the junction of two small streams. The one comes from the N., the other from the N.E., and the united waters flow under the lofty arch of a cliff-overhanging bridge, and down deep rocky dells, to the Ṣóghánlí Ṣú. To the S.E., the upland, terminating in abrupt but low cliffs over the town, is occupied by a new barrack and its attached mosque. In the valley between this and the central upland is part of the town and the Khán, while ½ a mile beyond is the large suburb called Ḳir Ḳullah; and at the entrance of the same valley, called Ḳayá O'ghlí, a detached mass of rock bears upon its summit the ruinous wall of a fort of no great antiquity.

The central upland terminates in a circular disposition of its low rocky cliffs, and is again continued in the centre of the town by a detached rocky terrace, which is also surrounded by ruinous fortifications, and is the present residence of the governor, and the prison of the place.

The next valley is divided into two minor ones, one of which is ornamented at a short distance by the suburb of Tóḳátlí, containing about 150 houses, embosomed in gardens, while at the top of a rock-terrace, and approached by a steep ascent, is the suburb called Kurán Kőï, the residence of the Greeks. Beyond this again are two other large villages, Bághlah and Búláḳ, each containing from 150 to 200 houses.

The town itself is situated in the mouths of the different ravines, and contains about 3000 houses of Mohammedans, while the Christians have 250 houses and one church, that of St. Stephen. Thus, without the suburbs, Za'farán Bólí may be considered to possess a population of 15,000 persons. It contains a tolerable chárshí or market, four handsome mosques, besides several smaller ones, two large kháns, and four public baths. Its chief trade is in saffron, which is largely cultivated in the neighbourhood, and has rendered this place one of the most flourishing and populous towns of Anatolia.

The terminal name of this city indicates a Greek origin, whether Hellenic or Byzantine. The first is a later interpolation of the staple commodity of the place. The tradition preserved by the Greek residents is that of a church founded here by Theodora, the wife of Justinian, and consecrated by the gift of a limb of St. Stephen, from relics brought from Palestine. It is probable that this empress, the frail object of Gibbon's just but unsparing sarcasm, met with kindness, or dreamt her first visions of future greatness, in Paphlagonia, which it is recorded she last left with the pleasing assurance that she was destined to become the wife of a potent monarch. The memory of such an event may have led in after-periods of devotion to the foundation of a church at a spot for which the name of Theodoropolis is still claimed.

It is recorded by Gibbon, on the authority of John Malela, Theophanes, and the historian of Justinian's building exploits,—Procopius,—that in the journey to the Pythian baths, through Bithynia, she distributed liberal alms to the churches, the monasteries, and the hospitals.

In that part of the Peutingerian tables which contains a cross road by Otresa ('Osmánjík) to Amasia, there is a back road which Rennell has supposed to be the same as the coast-line from Tium to Sinope, but which contains two names on the road from Amasia to Sinope, viz., Stephane and Thomia. The first name might have belonged to that community where the gem-covered member of the martyr is still most reverentially preserved—the second to Kastamúní.

Oct. 22.—We made an excursion to Ķará Bínár (black spring), a spot on the stony upland, 7 miles N.E. by E. from Za'farán Bólí, where, in a small isolated grove of dark pines, and amid numerous Mohammedan tombs, were fragments and capitals of columns of a plain Byzantine order, while in their neighbourhood a slab of rude limestone bears a still more rude effigy of a female figure, of less than natural size, the breasts bare, the face mutilated by time, and the shoulders ornamented with what were probably a pair of wings. Tradition has preserved no memory of this spot, at once claimed by the Mohammedans and the Christians as belonging to their progenitors, but whether a temple, a monastery, or a mausoleum, might be a matter of discussion.

We started by the village of Tóķátlí, and, leaving Ķir Ķullah on our left, crossed the easterly ravine of Za'farán Bólí, called Ķaya O'ghlí, and a limestone plain having two farms upon its almost naked surface; beyond this, and 6 miles from Za'farán Bólí, we crossed the deep and rocky dell called Şerb Dereh (rough valley), which we had also traversed at a point higher up, on coming from Dúr Sanlí. This deep ravine completely cuts Za'farán Bólí from the upland, and would form a strong natural line of defence.

We returned by another line, following the Şerb Dereh, and keeping the rivulet on our left-hand side, as far as to the valley of the Şóghánlí Şú, which we found full of villages. We passed through one large one, Yasí Kói, containing 300 houses of Mohammedans, and seventy-five houses of Greek Christians. It has three minarets, and the population is engaged in the cultivation of saffron, besides which the Christians manufacture wine and opium in small quantities.

Oct. 23.—Started early in the morning upon an excursion to see the junction of the Şóghánlí Şú with the river of Ḩamámlí. Our road lay across the Búláķ Dereh, a ravine picturesque as the

others, and then along the banks of the Ṣóghánlí Ṣú, till about 7 miles from the town we arrived at the junction of the two rivers, and at which point a bridge was carried over them. The united stream was 42 yards wide, 2 feet in depth, and flowing at a rate of about 3 miles an hour.

We returned from the place, over well-cultivated fields, now in part clothed with flowering plantations of colchicum autumnale, to the village of Búlák, from whence, passing over a rocky ridge, we entered upon a beautiful mountain-enclosed vale, at the foot of Orminius, covered with vineyards, and diversified by small country-houses. We journeyed up this valley about a mile to where it turns N., and at the head of this, passing over igneous rocks which have disrupted and borne up vast cliffs of limestone, we found a fine stream of water flowing from beneath the limestone rocks. We passed over the rocky beds, through which the waters had forced themselves a passage, and found an old channel blocked up by huge masses, which had fallen down from above, and probably diverted the stream from its original course. The good people of Za'farán Bólí make picnic parties to this picturesque spot, which is also famous among the Christians as the site of two monasteries—one devoted to Theodorus or Theodora, the other to St. John. The temperature of the water was 45°; the air 50°. We returned by the suburb of Bághlar or Bógházlú, so that we had now encompassed the town on all sides.

But the important point determined by this day's excursion related to the distribution of the rivers of Paphlagonia, concerning which more errors have crept into the maps than even in the upper course of the Halys.

All the maps indeed agree in making the river of Bólí flow into that of Filiyás, but all of them equally agree in making the rivers of Cherkesh and of Bayándír tributaries to the river of Bártán. But while Kinneir, Leake, and Lapie make the river of Za'farán Bólí (Ṣóghánlí Ṣú) and that of Aráj flow into the Halys by Kastamúní and Ṭásh Köprí, Rennell has made the Aráj, flowing from Kastamúní, join with the Ḥamámlí or Bayándír river, and flow into the Bártán.

All these various and conflicting views, each incorrect in some one particular, are simplified by the knowledge that the great basin of the Filiyás or Billæus river receives the waters of the rivers of Bólí, of Bayándír, of Cherkesh, and of Aráj, which flows from the western side of the Kastamúní hills, and joins the Bayándír river 2 hours above the junction of the Ṣóghánlí Ṣú with the same river. The Cherkesh or Bayándír river, which we had seen in 1837 at both those places, is said to flow onwards, and 8 hours from Ḥamámlí to receive the waters of the Mílán, coming from a mountainous country, including the governments of

Sháh-butún and O'lák; the chief places of which are Ak Básh, 4 hours from Mílán, and Pahlaván, 11 hours from the same place. Near Mílán are said to be some thermal springs, and opposite to the junction the village of Akchah Hisár.

The united rivers of Bayandír, Aráj, and Sóghánlí Sú flow through a pass in the Orminius at the foot of the Sarkhún Yáïlá-sí, and are said to receive the waters of the Bólí river 20 hours from this point, which must be very wide of the truth.

The basin of the Bártán river, or Parthenius, we have seen consists of two comparatively small streams, the Kójahnás and O'rdeïrí, both of which flow from the northern and western slopes of the Orminius and the Paphlagonian Olympus, and united are less in magnitude than the Filiyás before it enters the Orminius.

The latitude of Za'farán Bólí, by the mean of two mer. alts. of the sun, is 41° 13′ N.; its longitude, by chronometers, 32° 53′. We had much bad weather and snow while here. The mean height of the barometer was 28·450, indicating an elevation of about 1200 feet.

The rock formations in the Orminius consist of trap-rocks and trap-conglomerates, with limestones and sandstones which were non-fossiliferous; and of sandstones and superincumbent limestones in the plains, which abound in organic remains.

Retracing our steps to our former barometric station [3200 ft.] at Sabán Chilah, we found ourselves in the midst of snow and ice, and our road lay through forests, where the snow tumbled upon us from overladen branches of fir. At the village of 'Osmánzikí our attention was attracted by a dyke of compact quartz rock, rising like a wall 20 feet above the soil. The road was in other respects very uninteresting. The moorland being little diversified, when cultivated, there were a few villages,—when not, it was a continuous waste or forest-land. It was late in the evening before we arrived at an isolated house, where the 'Ayyán of that portion of Iflání which is under the jurisdiction of Za'farán Bólí resides. There were several robbers, in chains, walking about the house. In the valley of the 'Ayyánlik we counted fifteen small villages.

Oct. 26.—Crossing over some low sandstone hills, we came to a first valley of Bedil, with five villages, and then another, which expanded into a plain, cultivated in almost every part, and studded with villages, in the midst of which was the Bázár, or market-village, called Istánból Bázár. At Constantinople the term for the first day in the Mohammedan week is Bázár,* and for the second, Bázár Erteh-sí. In Anatolia the second day in the week is called Devrek, but, when applied to a market, they say Istánból Bázár, or Constantinople market (day).

* Market (day), gúní being understood. Bázár-erteh-sí, market's morrow, *i. e.*, day after market-day.—F. S.

At Chelebí Kói, N. 5 E. of the Bázár, an alt. of the sun gave the latitude of the place 41° 24′ N.; bar. 27.00 inches. After a short journey of 4 hours, we came to a stony district, at the foot of which was the residence of the 'Ayyán of Iflání, under the jurisdiction of Kastamúní: hence the two Ifláníś are always distinguished as Iflání of Za'farán Bólí, and Iflání of Kastamúní.

Iflání of Kastamúní is stated to have twenty villages under its jurisdiction; but the difficulty of obtaining information upon this subject may be judged of by the fact that the 'Ayyán of Iflání of Za'farán Bólí asserted that there were only twenty-four villages in his jurisdiction, while the 'Ayyán of Iflání of Kastamúní asserted that the same government contained nearly eighty villages.

A number of villages often assemble together to hold a court, more particularly in reference to taxation: they call this one Diván, and, when several unite, they are numbered accordingly. This arrangement is frequent in this part of the country; and hence, in the map, four or five villages will sometimes be found marked with the same name.

The mean elevation of the great upland of Paphlagonia may be judged of by the height of these places, situate at a distance from one another, and upon what constituted pretty nearly the average between the level of the valley bottoms and the tops of the undulating territory; such are Iflání of Za'farán Bólí, 3000 feet, Chelebí Kói, 2780 feet, and Iflání of Kastamúní, 2840 feet. The plain containing the Bázár of Iflání of Za'farán Bólí is about 100 feet below Chelebí Kói, while the dominating land, as at Sabánchilah (yet not out of the upland), attained an elevation of 3200 feet. The district of Dádáhí may be looked upon almost as a portion of the same upland, only that, at a height of 2400 feet, it is surrounded by mountains, and is separated from Iflání by the U'zún Búrún chain, the summit level or lowest part of the crest of which has an elevation of about 3600 feet.

To the north the Paphlagonian upland is broken up by abrupt and sharp or rounded mountains, and intersected by deep, narrow valleys; which, with their several rivulets and rivers, soon find their way to the Black Sea, through various windings and picturesque glens and ravines.

On this upland the cultivation consists almost entirely of wheat and barley; indeed it may be considered among the most productive wheat-countries of Anatolia. Besides this they also cultivate a species of *Polygonum* in the fields, and a *Chenopodium* in their gardens, principally to feed fowls, the eggs of which form a large article in their diet; but these seeds are ground also, and used in making bread. The gardens also furnish a little maïze in sunny exposures, and plenty of cabbages and pumpkins. The climate and soil are well adapted for potatoes. The appearance

of the fields, with their short stubble, the marshy spots covered with coarse sedges, and the green sward, with its long festucas, is very similar to that of many parts of Ireland. The land is both manured and regularly top-dressed. As a general average, 80 ákahs, or 220 lbs. of wheat, fetch 25 piastres, or *5s.*; the same measure of barley, *3s.*

Oct. 27.—Crossing the limestone rocks of Iflání, the road opened upon the cultivated valley of Ṣighir (ox,) beyond which was a small plain, with five villages under one court (Díván), named Tekiyyeh Kóï (convent ville). Beyond this, the character of the country completely changed, from a continuous upland, intersected by nearly circular plains and valleys, with gentle slopes, to more lofty mountains, chiefly with conical, although not actually sharp, summits; rapid, but not abrupt acclivities, and deep and narrow valleys, clothed to the base of their sides with forests of fir; which, on the mountain sides and summits, alternated with equally prolific, but now leafless, woods of birch.

One of these narrow valleys now opened before us, having a little cultivation, and corresponding groups of hamlets like *eyries* on its side, while a black forest spread out below. This district is called the Ḳará Agháj (black tree). It is in the 'Ayyánliḳ of Chílání, where we arrived after about half an hour's farther ride.

An hour's journey from Chílání brought us to the foot of the U'zún Búrún, and in another hour we reached the summit level or lower part of the crest, for which the barometer indicated an elevation of 3600 feet. This mountain chain extends nearly N.E. and S.W., and is formed of rounded mountains with gentle acclivities, covered with wood from the base to the summit.

The descent was more rapid than the ascent. We passed some fine specimens of pure quartzose rocks; but, unfortunately, night overtook us, and entering upon a plain studded with villages, and belonging to the 'Ayyánliḳ of Dádáhí, after a journey of 4 hours from the crest of the mountains, we arrived at the 'Ayyán's house (first passing the Bázár in the middle of the plain), and where we were, as usual, well received, and treated with a large fire.

The 'Ayyánliḳ of Dádáhí has under its jurisdiction about twenty-four villages: the cultivation is the same at an elevation of 2500 feet as that of the Iflání district; but maize, tobacco, and French beans are added to their productions: vines do not succeed.

The plain itself is formed by the union of several valleys, but more particularly two large ones, which extend to the S.S.E., and to the S.W. The first, Khónṣilar, contains eleven villages, of from seven to twenty cottages; the second, thirteen villages of a large size. The plain is surrounded on all sides by mountains, which are not continuous, but rather in groups. To the east alone are some limestone ridges above the isolated residence of the

'Ayyán; but to the S., the S.W., and the N.W. are groups of rounded schistose hills. The highest of these is called Gölgí Bel, now covered with snow at its summit.

Oct. 28.—Started at first in a N.W. and then in a N.E. direction, over the range of hills which bounded the plain of Dádáhí. Our road up the hills lay at first N., a little W., then N., and finally N. a little E. to the crest. The hills were covered with forests of oak and fir.

The descent was to the E. of N., by the village of 'Arabahchí-lar (Waggoner's-town), consisting of three parts on opposite sides of a narrow and steep valley. From this we turned E., through Gerish (three small villages), then over low, fir-clad schistose hills, down to a brook, where we first met with fine quarries of excellent roofing-slate, a fact that may not be uninteresting to the Turkish government, as the slates now used at Constantinople are brought, at some expense, from Europe, chiefly from England.

This valley soon opened and turned N. ½ E. to the vale of the Daurikán Irmák. It was most remarkable for its abundance of cranberry-trees, now in full fruit. The trees were small, with a hardy but stunted trunk, somewhat similar to the olive. Jays, blackbirds, and fieldfares were feasting upon the ripe berries.

On entering the valley of the Daurikán Irmák, here about 13 yards wide, by 1 foot in depth, our road turned due E., and, with some deviations, led us to Júrímarán, the residence of a mukhtár, or sub-governor, who was to provide us with horses for our further journey.

Oct. 29.—We followed the river's bank about E. by N. 3 miles. It then took a bend, crossing from N.E. from a different country, consisting of chalk cliffs and hills of flinty gravel, from which some neighbouring villages are employed in making gun-flints. Dereh Kói is a small village, prettily situated in a deep glen surrounded by precipices. To the S.W. is an extensive plain, cultivated and covered with villages, belonging to Kúreh Kazá-sí (Kúreh district). To the N. a hilly district, where is the bázár of Júrímarán, and a conical hill, on which are the vestiges of a castellated building: we obtained bearings of it from the next plain. Our muleteers professed not to know the road or the names of the villages, so we got a boy as a guide from the next we came to.

Continuing over the upland of Salmánlí, the chalk terminated in a long and abrupt precipice, forming a terrace of rock, which rests upon igneous formations, and extended from E. to W., fronting a broad, plain-like valley, which was cultivated, and abounds in villages belonging to the district called O'lunjeh.

Beyond this valley we passed through a pine grove on chalk and sandstone, at the head of which a rivulet flowed from a subter-

ranean passage: beyond this we came upon carbonaceous and other schistose rocks, and among lofty wooded hills. Night again overtook us, and there was no possibility of stopping; for had we done so our muleteers, who had been rebellious all day, would have decamped during the night, and left us without horses, so we made a forced march, ascending for upwards of an hour the mountains of Baḳir Kúreh-sí (copper district), and descending into the little mountain-basin, in which the town, attached to the copper-mines, is situated, arrived there at about 9 P.M.

Oct. 30.—The general effect of the town of Baḳir Kúreh-sí (copper district) is very good. It is situated in a deep hollow, for which the mean of the barometer gave an elevation of 2800 feet, and is surrounded by mountains, of which the most remarkable is called Baḳír Sultán. Its acclivities are covered with the red-looking refuse of former mining operations, and it terminates in a rocky pinnacle which rises 710 feet above the town. On this pinnacle is a tomb and a keeper's house. The view from the summit presented in every direction, a continuous succession of mountains, rounded out with steep declivities to the E. and W.; broken up into bold, rocky, limestone cliffs to the N., and overtopped by the more distant snowy summits of the Alkás Ṭághí *, to the S.E.; while clouds lay over the Black Sea like a white shroud spread at some distance beneath our feet. The effect of these mountains upon the climate may be judged of by the fact that the previous evening we were almost wet through by a drizzling rain, while the sky above was nearly cloudless, and the moon shone bright.

To the S.W. of the town is a conical mountain, named Ḳizil Ḳárá Ṭághí; to the S.E., Kirnáḳ Ṭághí, which we crossed on our arrival and at our departure; to the N.E., Ḳáz† Yúsof Ṭághí; and N. by E., the limestone cliff called 'A'r-Sizler Ḳayá. Such are the names of the principal mountains which are grouped around the copper-mines, comprehended by the Turks under the name of the Baḳir Kúreh-sí, *i. e.* copper district.

There is every probability, from the character of the scoriæ, that the veins or beds from which the ore was formerly obtained consisted of compact copper pyrites; but although we descended some distance into a shaft, we were unable to obtain a specimen, nor were any in existence in the town itself. It is now many years since the mines were wrought. In some cases the walls and roof of the galleries fell in; in others they were filled with water, although there still exists some doubt whether the deepest part of the shaft goes below the level of the valley, and if not, the mines might be recovered by carrying horizontal or slightly-inclined galleries directly to where the waters are accumulated: at all events

* J. N., p. 648.

† Ḳází?—F. S.

a little enterprise might, with the aid of machinery, recover these long-lost mines.

That they were formerly very productive may be deduced from a statement made in Gibbon, chap. lxix., that, in the time of Mohammed II., Ismaïl Beg, prince of Sinope, yielded to the conqueror of Constantinople, on his summons, a city and a revenue of 200,000 ducats, derived, it is said, chiefly from the copper-mines, an amount which, Gibbon says, appears enormous. The Turkish geographer of Anatolia has said after Strabo (p. 562), and the circumstance has been repeated in modern geographical works, that the people employed in these mines emit a horrible stench from their bodies when they come to the surface. This, it is evident, could only apply to former times; but when in the old galleries, we did not perceive any either uncommon or unpleasant odour. The Sandaracurgium * of Strabo, which, according to that geographer, was rendered hollow even in his time by the continual mining operations carried on in its interior, was a branch of the Olgasys, Alkás Tagh. Now as the Bakir Kúreh-sí are situated in the Yerálah Göz, a rocky region, only, as it were, detached from the loftier range, from which it also borrows its name, it is not impossible that the places may be identical.

In the present day a few thieves and convicts only, besides some more respectable persons, are engaged in sifting and collecting from the refuse of former times stones that may again be sent to the furnace with some chance of profit. It is curious, in examining the vast piles of refuse among which they are carrying on their labours, to observe how regularly the stones have become stratified, and how frequently the formation of carbonate of copper †, even in a botryoidal form has taken place. We also found a specimen of bone passing into a substance resembling turquoise, from impregnation with copper.

The furnaces were formerly upon the brow of the hill, where the former refuse exists, but they are now 16 in number in the valley, close to the water, by the aid of which bellows, of small size, are made to work.

The town itself has a handsome mosque, and upwards of 200 houses, of which one-half only are substantially built, the remainder are the dwellings of poor miners, and often ruinous and untenanted. With the loss of its resources, the town has fallen into great poverty. Its latitude by the sun's mer. alt. 41° 47′; its long. by chronometers 33° 50′ E.

Nov. 1.—We left Bakir Kúreh-sí by the gap in Kirnák Tághí,

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* *Sandaracurgium* signifies "arsenic works," and is therefore a mine; consequently hollow as far as it has been worked.—F. S.

† Bicarbonate of copper and hydrate of copper.

and descending into the valley, followed the upward course of a rivulet flowing N.E., and round a mountain called I'kinjíler, composed of coarse clay-slates and ironshot schist, and covered with forests of pine and birch. We continued to ascend for a period of 3 hours, through forest and bad roads, made worse by increasing rain. The country then opened, and became less wooded; and after we had passed a high limestone cliff, we found the same rock beginning to abound, and forming a new feature in the district. A few miles farther, ostracite sandstone made its appearance, and we entered upon the plain of Daurikán, or Kúreh Kazásí (the Kádílik of the mining district), full of villages and well cultivated, and bounded by hills of pink and white cretaceous rocks.

Nov. 2.—The valley of Daurikán contains the river of the same name, which we had already seen at Júrimarán in a rocky district. It extended from N.E. to S.W., and contained fourteen villages, most of them large. We left the village of Daurikán the next day, and our route lay over hills of trap, black schist, and limestone, without wood, but pasturing cattle. Crossing two valleys we came to a low crest of wooded chalk hills, where is a guard-house; a little beyond these the valley of the Gök Irmák was spread out at our feet, studded with villages and plantations, and backed by the city of Kastamúní, above which towered an old castle placed upon a rock.

From Za'farán Bólí to this place, except in the low valley of the Júrimarán, our elevation had probably never been less than 2000 feet above the sea. At Bakir Kúreh-sí 2800 feet, and at Daurikán, on the high upland of Yerálah Göz, and near the sources of the river of the same name, an approximate observation gave 3240 feet. This fact, which had hitherto been rendered most apparent to us by the climate and vegetation of the country we were travelling through, was now made actually visible, for, without having made any particular ascent from the general level of our road, the head of the Gök Irmák, which river had still to flow some distance before it joined the Kízíl Irmák (Halys), and must then still have a descent towards the sea, was at a level of several hundred feet below us.

On our road to Kastamúní, where we arrived early in the afternoon, we passed the river of Dádáhí flowing into the Gök Irmák, which it exceeded in size, being about 10 yards wide by 1 in depth, while the river of Kastamúní is only from 7 to 8 yards wide where 1 foot deep, and becomes very shallow when spread over a large surface.

Nov. 3.—Kastamúní is a large Turkish town, situated in a valley from ½ to ¾ of a mile wide, which it completely fills up: a

break in the hills which bound the city on the west formed another valley, which is filled up with suburb called Ḥisár Ardi,* while upon the rocky cliff above stand the ruins of an ancient castle.

The total number of houses is said to amount to 12,000, giving a population of 48,000 persons. From our inquiries the Greeks have only 110 houses, and the Armenians 20. The former have a small church dedicated to St. John the Baptist. The Armenians meet for prayer in a khán. In the Mohammedan city we counted thirty-six minarets, and there are twenty-four public baths.

The principal trade of Ḳastamúní is in wool, of which the the neighbourhood is said to produce nearly as good as that of Angora. The men also work largely in copper, and the women in cotton brought from 'Adanah in Cilicia, and of which sails for shipping are made and sent to Constantinople. They also print cottons and tan leather, but in the latter article Ṭásh Köprí excels them. There are said to be thirty-two printing-houses, having from four to eight presses each, also twenty-two dyeing-houses, of which six are for red and sixteen for blue dyes. There are only two tanneries. The country produces no grapes: wine is brought from Ṭósiyyah, rice from Ṭósiyyah and Bói-ábád, a little silk also from the latter place, and water-melons from Ṭásh Köprí and the gardens along the Gök Irmáḳ.

There are in the city four monasteries (Tekiyyeh) of stationary, and two of itinerant Dervíshes. The castle is a very rude structure, built of the same coarse sandstone as the rock on which it stands. The mortar is a mixture of lime and pebbles. Some of the towers, three of which are round, are nearly 50 ft. high; another is partly built of tiles, and some square ones, more especially such as flank the outer wall, are of better construction, and formed of larger stones, probably belonging to a more remote era than the rest. A plan was made by Mr. Russell, whence it appears that the castle is of an oblong form, 414 ft. long by 60 wide.

Ḳastamúní has always been under the Turkish dominion, the capital of a province or sanjáḳ, and was a long time the residence of a páshá, but, under the economical reforms of the present sultán, it has been made the seat of a mutesellim under the Páshá of Angora. Little more than a century ago the Christian inhabitants were expelled from this city and forced to take up their residence in a village on the Gök Irmá , still designated as Gaúr Köï. When re-admitted to live and trade within the precincts of the town they had no church, and only their old burial-ground, till under the present sultán, a fermán was granted, allowing them

* J. N., p. 648. Vulgo Ardhí.

to build a church and bury their dead near the abode of their forefathers.

The population and extent of Kastamúní claim some attention, though its situation is not among the most picturesque in Asia Minor, and notwithstanding its commerce is very inconsiderable. Some of the mosques and the new barracks rise above the surrounding houses, and are rather superior to common buildings; but the houses, although of two stories, are in general ill built; the streets are narrow and dirty, and the centre of the town is washed by a deep kennel, into which the filth of the whole place is collected. There are no open quays to enliven the scene, and only here and there a covered wooden bridge, across which the Mohammedan has to pick his way, lest he should wake the sleeping dogs, and be defiled by touching them.

Kastamúní is not unfrequently visited by the plague, and is always liable to bad fevers, more particularly malaria, which is said often to assume a very fatal type. At an altitude of 2350 ft. above the sea, the snow is said to lie two months upon the ground, and the summer to be very hot.

It is, however, in its past history that Kastamúní, with its commanding though ruined castle, presents itself to us with features of peculiar interest. The ancient title of Constambol, the city of Constantine has been claimed for it (Bell, vol. iv. p. 107). It is still called Constambel in a modern Greek work on geography published at Smyrna; and Kastambol is the most frequent name by which it is known out of the precincts of the town. Rennell even claims for it the still more ancient name of Germanicopolis, but it is better known in the pages of modern history under the name of Castamona (Castamon, Leake*), as the patrimonial estate, if not the capital of an independent kingdom under the Comneni family, before that family attained the power and the eminence which upheld for a while the fate of a sinking empire (Gibbon, chap. xlviii.). And the same fertile district, secluded by mountains on every side, was also the stronghold of an independent prince expelled by Ýlderím Báyázíd, re-instated by Tímúr, and again expelled by Muhammed I.

We have already had occasion to comment upon the comparative geography of the river Kastamúní. This river, designated as the Karású on the maps, is known by the name of Gök Irmák from its sources, 8 hours above Kastamúní, to its junction with the Kizil Irmák or Halys. At Kastamúní it is a mere rivulet 7 yards wide by 1 ft. deep, but 6 miles below it receives the river of Dádáhí, 10 yards wide by 1 in depth. The united streams flow onwards by Tásh Köprí and Bói-ábád, to the Kizil Irmak. The

* A probable abbreviation of Castra-Comneni.

river of Sarpunja is placed by Kinneir as a tributary to the Kastamúní river; but from all the information we could obtain, it appeared to flow into the Aráj. Kinneir first showed the connexion of the river of Kastamúní with the Halys. Rennell by mistake introduces two rivers, one of Kastamúní, the other of Tásh Köprí, and both flowing into the sea at different places.

The weather was very cloudy and uncertain during our stay of 3 days at Kastamúní. The lat. by the sun's mer. alt. was 41° 21′ N.; long. by two chronometers 33° 56′ E.; bar. 27.284 inches, indicating an elevation of 2400 feet: we also made observations for dip and magnetic intensity.

The rocks around Kastamúní consist, below, of primary schists; above these are cretacecus rocks, white, red, or brown, with few organic remains. The upper beds of chalk alternate with sandstone conglomerate. This rock crowns the castle-hill, and passes, in the hills E. and W. of the town, into sandstone. To the W. of the castle-hill the sandstone dips 7° E., but beyond this, and over the adjacent valley, the same beds dip W. at an angle of 9°.

The contrast of the dark-coloured schists with the red and white cretaceous beds furnishes some of the most remarkable features in the neighbourhood, more particularly in the glen at the N.W. extremity of the town.

Nov. 6.—We continued our journey, proceeding along the valley of the Gök Irmák, which flowed with few windings to the N.E. about 5½ miles, at which point low sandstone hills advancing from the S. from the neighbourhood of Kastamúní come down to the edge of the river, which, curving round the hills, afterwards take a course of E.N.E. We stopped at this point to obtain the sun's mer. alt., which gave the lat. 41° 26′. A little farther on the Gök Irmák receives a small tributary from the S. The temperature of the water was 13° cent.; of the air 13½° cent. 1½ mile farther we crossed the same river by a covered wooden bridge, beyond which the river stretched to the eastward along a pleasant valley, cultivated, full of villages, plantations, and gardens. 7 miles beyond the bridge the river enters into a rocky ravine, and is lost sight of for about a mile, when turning to the N. of E. it enters upon the valley of Tásh Köprí, surrounded by rocks and mountains, but wooded and cultivated in its centre, and abounding in villages.

Nov. 7.—Tásh Köprí (stone bridge) is on the right bank of the Gök Irmák, and is approached by a bridge 75 yards long, which formerly consisted of four arches; two of these now remain, and two others, which were carried away, are replaced by three low and badly-constructed modern arches: the river, which here flowed from W. to E., divided itself into four shallow streams.

The town is said to contain 1500 houses: we counted 10 minarets, 2 kháns, and 2 baths: tanners and blacksmiths form a large part of the population.

The number of architectural remains in Ṭásh Köprí attest an ancient site: old columns and hewn stones, cornices, &c., abound in the cemeteries. We visited a small building yclept a madreseh or college—a collection of hewn stones and remains of antiquity, put together in the form of a parallelogram, with an open space in the centre, and two rows of ancient columns, not two of which had capitals of the same order.

Near the building was a beautiful sarcophagus of white marble, 7 feet 9 inches long, 4 feet wide, and 3 feet 6 inches high, and ornamented laterally with wreaths encircling a mutilated human face: bulls' heads were sculptured on the sides and rams' heads at the corners, with bunches of grapes beneath. On the left bank of the river is a low hill, which is pointed out as having once borne a castle, of which there are no ruins at present. On a stone near the gateway is a mutilated inscription, of which only a few letters are legible. Mr. Russell also copied other inscriptions from the walls of the college, from a modern fountain, and one from the interior of a tanner's house. The following, which confirms the supposed identity of Ṭásh Köprí with the ancient Pompeiopolis, is inscribed on a large slab of stone inserted laterally into the wall of the building above alluded to as constructed of materials of former edifices and called the college. As an excuse for any inaccuracies, I should state that both this and the following were copied by Mr. Russell during a heavy shower of rain:—

ΑΓΑΘΗΙΤΥΧΗΙ
ΚΑΙΟΝ ΚΛΑΥΔΙΟΝ
ΓΑΛΙΤΤΙΑΝΟΝ
ΤΟΝ ΠΑΛΛΙΚΟΥ ΑΓΡΟ
ΝΟΜΕΑΝΤΑ ΦΙΛΤΑΤ
ΩΣ ΗΒΟΥΛΗ ΚΑΙ
ΟΔΗΜΟΣ ΤΗΣ ΜΗ
ΤΓΟΠΟΛΕ ΩΣ ΠΟΜ
ΠΗΙΟΠΟΛΕΩΣ...Ω
ΑΝΕΘΕΝΤΟ ΑΝΔ ΡΙΑΣ
ΕΝΕΚΕΝ.*

The following was in the front of a fountain in the N.W. quarter of the town:—

* To Good Fortune. Caius Claudius Gallitianus, the son of Pallicus, the kind administrator of the country, the senate and people of Pompeiopolis, the metropolis, have dedicated on account of his courage.

L. FLAVIVS ASCLEPIADES
PETRONIANVS HIC POSITVS EST.*
ΛΟΥΚΙΟΣ ΦΛΑΥΙΟΣ ΑΣΚΛΗ
ΠΙΑΔΗΣ ΠΕΤΡΩΝΙΑΝΟΣ
ΕΝΘΑΔΕ ΚΑΤΟΙΧΕΤΑΙ.

It is well known that Kinneir, and after him Colonel Leake in his Map, identified Tásh Köprí with Pompeiopolis of the tables, and which site Rennell has sought for at Tósiyyah. The information given by the tables is so inaccurate, that, without an inscription, a coin, or monument, to satisfy the mind, the rest is all conjecture. If we take the distance given by the tables of Pompeiopolis from Gangra, the former comes nearer to Tósiyyah; but will the 27 m.p. given from Pompeiopolis to Sinope agree with the same place? Again, if Tásh Köprí (of which there now seems no doubt) be Pompeiopolis, it is much more than 35 m. p. from Gangra.

Having so far examined the antiquities of Tásh Köprí, we started, quitting the river flowing N.E., and began an ascent of the Ilik Tágh, a spur or rather portion of the Alkás Tágh, which here crosses the valley of the Gök Irmák, and unites with the Yerálah Göz, beyond which again, and nearer to Sinope, were some high and lofty pinnacles of limestone reposing upon primary schists.

Our general direction was E. by N., and we stopped upon an adjacent plain to take the sun's mer. alt., which gave for this place N. lat. 41° 29′. 400 yards to the W.S.W. was a small village of 7 houses called Khazíneh-dár Köï (Treasurer-ville), and about ½ a mile N. 42 E., but separated by a deep ravine, the dismantled walls and crumbling fragments of a castle occupied the summit of a nearly insulated rock. This castle was named Kiz Kal'ah-sí (Virgin-castle); not an uncommon name in the East, as, for instance, near Köpri, and probably referring to the castle's never having been taken. It appears to be the same as the Hisár I'má of Rennell, from which he named the chain of mountains which are now particularly known for furnishing the best masts for the Turkish navy, and consequently agreeing in this point with the Ilik Tágh.

Leaving the castle on our left we descended into a ravine with rivulets flowing to the Gök Irmák, where we found fragments, apparently of old arches, called Chekmák Kápú-sí (Tinder-box bridge); but whether a bridge or a defence to the defile it is difficult to determine.

Our ascent of the Ilik Tágh commenced from this point, amid rocks of mica slate, &c. We soon entered upon the pine forests, and attained the highest level of the range, where the barometer

* Lucius Flavius Asclepiades Petronianus is placed here.

indicated an elevation of 4000 feet. The only species of pine was the *Pinus pinea.* Some trees which we measured were upwards of 100 feet high, and 3 feet 4 inches in diameter, cutting into timber of 1 foot 9 inches square. Our ride through the forest was dreary and monotonous, and we only arrived after dark, and amidst the din of jackals, at Kavváshah Tekiyyeh-sí, as its name shows, a convent of dervishes, of whom there were four, out of the inhabitants of about 15 cottages.

Nov. 8.—Started early up hills of crystalline schists, the country around being now more bare of trees and in part cultivated, but at an elevation of about 3200 feet. After travelling 2 hours through this tract we opened upon the valley of the Gök Irmák, which immediately upon leaving the mountains was as crowded with villages as when we last saw it. Limestone had for some time past succeeded to the pine-clad schistose rocks, and they were themselves now succeeded by trap rocks and altered formations; but the valley of the river derived a new feature from the predominance of vast deposits of detritus; the acclivities, offering little resistance to the action of rain and springs, were deeply furrowed by ravines without any vegetable covering, and presenting a curious succession of different coloured indentations.

At an elevation of about 1770 feet above the sea, and about 700 above the level of the river, we stopped to get the sun's mer. alt., which gave the lat. 41° 28′ N. The hills around were clad with juniper (*J. Phœnicea* and *J. macrocarpa*) and with dwarf and prickly evergreen oak. A little more than an hour's journey brought us to Bói-ábád, a small town beautifully situated upon a tributary to the Gök Irmák.

Nov. 9.—Bói-ábád contains about 300 houses, in which the population is said to consist of 1000 females and 800 males. The town is divided into 11 mahallahs or divisions, each said to have its mosque: this is an exaggeration. There are 3 kháns and 2 ballis. The town is rather scattered, which adds to its beauty, and occupies a valley to the E. of the rivulet. The bed of the latter is filled with luxuriant gardens, full of fine fruit-trees overrun by vines. The rivulet of Boï-ábád is called Káz Dereh-sí (Goose-valley), and to the N. flows, in an open and cultivated vale about a ¼ of a mile in width, to its junction with the Gök Irmák (Amnias); but to the S. it issues from a narrow and secluded vale, containing a large village bearing the same name. This upper vale of Káz Dereh-sí is separated from the valley of Bói-ábád by the limestone rocks which bear the remains of the castle or hill-fort, and the rivulet passes from the one valley into the other through a ravine with perpendicular sides at least 300 feet in height.

Boï-ábád appears to be partly a Persian name, in which lan-

guage A'bád means a city. Bói has scarcely a Turkish meaning; in Wallachia and Moldavia Boï or Boïavar is a name applied to landed proprietors or lords of the soil. The best-informed natives had no idea of the meaning, but the Turks corrupt it sometimes to Boïvad or Boïavat, as it appears on some maps.*

The castle, which is attributed by the natives to the Genoese, but bears no inscriptions, was long the seat of an independent chieftain. It still contains within its walls about thirty dwelling-houses, which are said to have been deserted only about 8 years ago, when its lord was a certain Husein, the last of the Chipawis† or Sipáhís (Gibbon, c. lxv.), a term used by the people of the country, and corresponding to the original of our Anglo-Indian term "sepoy." The last chieftain is said still to be alive in Constantinople; but his property was confiscated, and his followers have turned to the humble occupation of gardeners. When we visited this hill-fort, of which a plan was made by Mr. Russell, there was not a person within its walls, and the houses, still new although built of wood, were deserted as if yesterday: the pathway being overgrown with viper's bugloss (*Echium Creticum*), spurge, and other weeds, gave an almost painful idea of sudden desolation; but the inhabitants below spoke of the thing in a manner highly characteristic of the feeling at present predominant in Anatolia. "Of what use is it to live secluded on yonder mountain? Is it not better to dwell among gardens and corn-fields?"

By three sets of lunar distances we made the long. of Bói-ábád 34° 51′ E.; lat. by sun's mer. alt. 41° 27′ N.; variation 9° W.; barometer 28° 8, indicating an elevation of about 1000 feet above the sea.

Nov. 10.—Continued our journey along the valley of the Gök Irmák, passing villages at almost every mile and a half, till we had travelled 4 hours, when we turned to the right, about a mile along the banks of a small rivulet, to the village of 'Alí Páshá-Shálí, where we stopped for the night, in a room similar to what we had at Bói-ábád, without a window, and dark as a dungeon.

The valley of the Gök Irmák averaged to-day a width of from ½ mile to 1 mile; and from its numerous windings, wooded hills, and rocks, its general luxuriance of vegetation, and its villages and corn-fields, furnished a continued succession of fine and varied landscape.

The recent breccia and sandstone here rose in hills to an elevation sometimes of upwards of 800 feet; and although at first a mere pebbly detritus, as we proceeded down the valley, the same

* It is properly Bóyá-ábád, dye-town. Bóyá, colour or dye, is Turkish; ábád (abode), Persian. Such compounds are not uncommon.—F. S.

† Probably of the Chapwán family. Sipáhí is a Persian word signifying "soldier;" misspelt *Spahi*, and *Sepoy*. It could hardly be changed into *Chipawi*.—F. S.

deposit assumed the character of true sandstone and sandstone conglomerate, rising often in lofty and nearly vertical precipices, in which the character of the beds varied much, from coarse to fine breccia, and from rude conglomerate rock to siliceous and calcareous freestone. From various circumstances there seems reason to believe that this valley had its existence, at least in part, anterior to the last igneous agency which disturbed the surface of Eastern Paphlagonia.

Nov. 11.—Quitting the valley of 'Alí Páshá-Shalí, we again entered upon that of the Gök Irmáḳ, and passing Ṭahirán, now a village, but formerly a small Mohammedan town, found the valley beginning to lose its dimensions, and to be shut up by diallage and euphotide rocks, supporting compact limestone, and advancing in wooded precipices or rocky promontories (Ḳará Denín) upon the bed of the river. A little farther we came to the junction of the Gök Irmáḳ and the Ḳizil Irmáḳ, which occurs in an open space; after this the latter having passed through high and precipitous rocks to the S.S.W. descends to the N. by E., and then suddenly sweeping round to the S., forces its way through a defile formed by perpendicular cliffs of limestone, called Ḳará Depeh (Black vale), while the rocks which it thus encloses to the S. are named the Adá Ṭagh (Island-mountain). The latitude of the point of junction of the two rivers by the sun's mer. alt. was 41° 22′ N.

It was our intention to have proceeded up the banks of the Ḳizil Irmáḳ to Ḥájí Ḥamzah, and from thence to 'Osmánjiḳ; and notwithstanding the many representations made to us of the impracticability of this route, we were determined to attempt it. Proceeding, however, up the Kizil Irmáḳ, about a mile from where it receives the waters of the Gök Irmáḳ, we came to the village of Beg Köï, beyond which the former river comes through perpendicular rocks of schist and limestone, which afforded neither passage below nor above on either of its banks. Under these circumstances we could not do better than proceed down the river to the ferry of Vezír Köprí, and, from that place, cut off the westerly bend of the stream towards Ḥájí Ḥamzah, meeting the river again at 'Osmánjík.

Accordingly we forded the Gök Irmáḳ near its junction, and proceeded through the pass of the Ḳará Depeh. This pass, unless Paphlagonia extended farther east in the time of Xenophon, would appear to apply itself peculiarly to the description given by Hecatonymus, one of the ambassadors from Sinope to the Greeks at Cotyora, who said that Paphlagonia must of necessity be entered by but one pass, and that lay between two points of a rock exceeding high. The river runs through a gorge in a limestone range, which extends from S.W. to N.E., forming on the

S. bank a conical rock about 250 feet high, and then rises in a wide rampart of rock to the N.E. till it forms cliffs, at the distance of scarcely 2 miles, nearly 1000 feet in height. To the S.E. numerous rudely-shaped pinnacles of limestone crown the mountain summits, upon one of which there are some ruins, apparently of a monastic character, concerning which we could not obtain any information.

This defile has, in modern times, obtained notoriety from the frequency of the robberies committed in a neighbourhood so well adapted for such exploits; and this circumstance led the Turkish government to build a guard-house in the pass, which was tenanted by two useless veterans, who, however, gave us a hospitable shelter for the night. Long. by chron. 35° 14′ E., lat. 41° 21′ N.

From the upland plains of Iflání, at a mean elevation of 2500 feet above the level of the sea, we had descended to Kastamúní, at the head of the valley of the Gök Irmák, about 150 feet. In following the deep declivity of that hollow, in part filled with detrital deposits, already at Tásh Köprí, a distance of about 24 miles, the level had descended 550 feet more; at Bóï-ábád, by 800 feet more, and at the junction of the same river with the Kizil Irmák, by 600 feet more; the level at the confluence, by barometer, being about 450 feet above the level of the sea: but through the rapids of Kará Depeh alone, the Kizil Irmák descends at least 100 feet; the elevation at the Guard-house, below the pass, being only 350 feet, or 100 feet less than at a distance (by windings) of about 8 or 10 miles; and consequently having a fall of more than 10 feet to a mile. The river was flowing at a rate, by our measurements, of upwards of 5 miles an hour.

The influence of so rapid a decrease of elevation, combined, more especially, with the increased temperature of a valley where vegetation is protected by hills, the radiation of the sun from their sides, and the evaporation from numerous rivulets, is equally marked by the successive changes of the vegetable productions.

On the plains of Iflání, as previously seen, barley and wheat form the chief, if not, besides some culinary vegetables, the sole produce; but even at Kastamúní, in the valley of the Gök Irmák, maize, tobacco, gourds, and a few melons, are produced; grapes, however, do not ripen well. The same fertile valley, down to Tásh Köprí, is for the most part cultivated, as far as to the base of the hills; while the water-side is occupied almost everywhere by villages and gardens, in which grapes begin to abound, and melons of various kinds are raised. Walnut-trees, deciduous oak, willows, and tall poplars are frequent.

The great forest of the Ilik Tágh, stretching from the water-side up to an elevation of 4000 feet, consists almost entirely of pine-trees *(Pinus pinea)*, which attain a height of upwards of 100 feet. These forests, therefore, are still, as they have long

been, the most valuable of any in the Sultan's territories for timber of that description.

In descending from the Ilik Ṭágh to Bói-ábád, some rocky tracts afford a flourishing vegetation of shrubs of cypress, two species of juniper and evergreen oak. The castle-hill is covered with spurge. The fruitful valley below affords food for the few silkworms kept in this neighbourhood; vines, without care or cultivation, climb over the tops of the highest trees; and the gardens of the Ḳáz Dereh-sí produce the most delightful fruits and vegetables in Anatolia.

In the valley of the Gök Irmáḳ and the lower part of 'Ali Páshá Sháli, much rice is cultivated, as usual, in small fields, for purposes of irrigation: this, with that from Ṭósiyyah, supplies all the markets of this part of the country, and leaves a surplus to be shipped at Sínúb (Sinope), for the market of the capital. In this part of the valley the Acacia spinosa begins to make its appearance, and soon afterwards, with the evergreen oak, covers extensive slopes, and forms, together with it, the chief vegetation of the district. The larch is now not unfrequent in the ravines, and on the sides of hills a species of privet also becomes common—rose-trees abound; Arbor Judæ (*Cercis siliquastrum,*) is more rare. The Astragalus tragacanthus and Acacia spinosa render the thickets almost impassable. Broom and box are interspersed here and there; and that useful plant, *Rubia tinctoria,* flourishes under the hedges of madder, bramble, and privet.

At length on the banks of the Kizil Irmáḳ, coarse grasses are replaced by the three-fingered grass (*Dactylaria dactylon*). The cypress becomes a tree of some size. The pine is succeeded by the Pinus pinaster, a stunted tree which climbs up the acclivities of the Ḳará Depeh, till stopped by vertical precipices of limestone, over which, again, it often shows itself, but in separated patches or solitary trees, with roots issuing from crevices in the rocks, at the foot of which, even at this advanced season of the year, a scentless but pretty-coloured pink was in full flower. The banks of the river were clad with Syringa argentea, and the Tamarix. There are no Oleanders, but wild vines, like the climbing plants of South America, convert the trees on the banks of the river into shadowy bowers. There is also some underwood, chiefly tamarisks and blackberries, with sedge and tall grass, which shelters many wild boars. The evergreen oak still possesses itself of pebbly promontories and declivities of detritus. These features in the distribution of the vegetation disappeared when we left the river to approach Vezír Köprí, and an undulating and low hilly country of schist was uniformly covered with a shrubbery of deciduous oak and juniper, as well as some privet, till the same soil was reclaimed by cultivation, through the industry and wants of the inhabitants of a town and numerous villages.

Nov. 13.—We travelled along the banks of the Kizil Irmák, 9 miles from the guard-house to the ferry, which we crossed in a rude boat. There were few villages in this part of the valley. We passed a ruinous khán, and a bridge which had been commenced, but never completed.

The river at this point was 80 yards wide, had a current of about 4 miles, and was from 3 to 4 feet in depth.

Following the river a short distance, we came to a steep cliff advancing upon the river, which appeared, at the distance of a mile or two, to pass through lofty cliffs of limestone, somewhat similar to those at Kará Depeh. There is no road along the river's banks to Báfirah. Turning at this point to the S.S.E., we passed the village of Cheltijak, containing about twenty houses and a mosque, and entered upon the country of low shrubs, previously described, reaching Vezír Köprí just as night set in, about 9 miles nearly S.E. of where we left the river's side.

Nov. 13.—The town of Vezír Köprí is situated in a hollow, containing a mere rivulet, which soon flows into a country of rude limestone rocks, while the more fertile district is backed to the south by the Ṭavshán Ṭághí. It contains about 1000 Mohammedan families, fifty Armenian, and twenty Greek, each of which sects has a church. The town is divided into quarters, sometimes separated by party walls; and the market is divided in the same way, each portion having regular gates for its protection. There is a bezestán, or covered market, for silks and fine goods, which is a tolerably well-looking edifice, with four domes built of tiles. At each of the gateways of this building a tombstone is dovetailed into the wall. One of them contains a mutilated inscription, and the sculptured insignia of a Greek priest. The other also bears an inscription, which, although turned upside down, was more legible:—

ΣΕΜΝΩΣ
ΚΑΙΖΗΣΑΝ
ΤΑΚΟΣΜΙ
ΩΣΕΤΗΜ
ΚΥΡΙΛΛΗ
ΣΥΤΟΥΤΕ
ΚΝΩΣΑΣΑ
ΜΕΤΑΥΤΟΥ
ΜΝΗΜΗΣΧΑ
ΡΙΝΕΝΤΩ
ΡϘΒΕΤΕΙ.*

* "Honourably, and having lived respectably forty years, Cyrilla, daughter of Sytus, who bore children to him. In memory [of him erected this monument] in the year 172."

There are no ancient buildings in the town, but some of the hewn stones alternating with tiles, which have been used in the construction of the baths, appear to be of better quality than are generally found in mere Mohammedan buildings. Fragments of columns are also not unfrequent. The four kháns are poor places; and only one of the four baths is good. The lat. by sun's mer. alt. is 41° 7′ N.; the long. by chron. 35° 35′ E. The mean of the barometer was 29·100, and at this low elevation, of about 800 feet, cotton and mulberry trees are cultivated; and storks' nests make their appearance on the chimney and house tops.

Vezír Köprí was formerly called Kedí Ḳal'ah by the Turks; and 4 hours to the south there is a castle situated upon one of the highest and most conical peaks of the Ṭavshán Ṭághí, called Ṭavshán Ḳal'ah-sí (Hare-castle). We would have visited this castle from Vezír Köprí, but did not know of its existence till we observed it far away to our left, on our route to 'Osmánjiḳ.

Nov. 15.—Our route lay up the valley of the river in a direction W. by S., towards the foot of the Ṭavshán Ṭághí (Hare-mount), with few villages and a scanty cultivation, also blocked up at a distance of 6 miles by rocky knolls of limestone. After travelling 3½ hours we came to the foot of Ṭavshán Ṭághí, and commenced our ascent amid forests of deciduous oak gradually becoming trees, interspersed with pine and beech. The ascent lasted 2½ hours, the rocks consisting of sandstone and limestone. The sandstone continues to the summit of the range, when it becomes laminar and schistose, dipping at a high angle to the S.W. At the crest the vegetation consists chiefly of small birch trees, covered with lichen, and in a state of decay, with shrubby vaccinium at the foot. At the summit, the barometer indicated an elevation of 3690 feet above the sea. After continuing along the crest for upwards of an hour, we descended the opposite declivity, 680 feet, to Kósájak, a village situate in a ravine amid cliffs of schistose and limestone, and inhabited by charcoal-burners attached to the silver-mines of Gúmish Khán. A curious phenomenon exhibited itself here in a huge mass of limestone, about 300 feet long by 100 high, which lay detached upon the declivity of a hill of mica slate. It certainly was not a boulder-stone, and was more probably tilted up into its present position.

Nov. 16.—Continuing along the valley of Ḳósjak in a W. ½ S. direction, we descended gradually towards the valley of the Ḳizil Irmáḳ. At a distance of about 9 miles we entered upon a plain bounded to the N. and E. by limestone cliffs; to the S.E. was the defile through which the great Constantinople road is carried from Merziván to 'Osmánjiḳ, which we soon afterwards joined at two or three straggling cottages called Ḥájí Ḥasan. The sun's

merid. alt. gave the lat. of the centre of this plain 40° 58′; bar. 28·230.

From this point to the gap in the mountains above the valley of the Karchak Chái, about 5 miles in distance, the road lay to the S. of W. Hence the Constantinople road is carried by the pass of Menzil 'A'shikí to the N. of W., a point of importance in the construction of this part of the country.

'Osmánjik, with its trachytic pinnacles and castellated ruins, has been so frequently described, that we need not enter into any detail respecting it. The Kizil Irmák at this place flows from S.E. to W.N.W. Bajazet's Bridge (Báyazíd's) consists of thirteen arches, and is 283 yards long, 8 wide, with water at this season of the year in only half the channel. The town has 300 houses, five mosques, and three kháns. The lat. by altitude of α Polaris 40° 57′ N.

Nov. 17.—We pursued our journey southwards, following the banks of the stream for 10 miles, when we left it to the right, the river crossing through a gorge in the mountains formed by the junction of the Kirk Delím mountains and those of Iskilúb. The Kizil Irmák is in every respect a fine river, both below and above this pass, where we ferried across it on our way to Iskilúb; but it does not equal what would *à priori* be expected from a river of such a long course, and fed by so many large tributaries. In the valley of 'Osmánjik, and in that of Kánkarí, it is no more navigable than it is in the districts of the Kirk Delím, or the Adá Tágh. An exaggerated idea of the magnitude of this river has obtained credit in Europe from the vague reports of travellers, who have not adopted the test of actual measurement. Tavernier calls it a large river at Kesrá Köprí; Tournefort compares it to the Seine near Angora; Mr. Charles Vaughan estimated it pretty accurately at 160 yards at 'Osmánjik; and at a different season of the year it had appeared beyond Suaz, to some of our party, almost as large as it now was in the vale of Kánkarí. Several writers have called it Aitoe-su and Atoe-su;* but below Angora we found it generally recognised as the Red River, or Kizil Irmák. The fact mentioned by Tournefort, and noticed by Rennell, on the authority of Hají Khalífah, of its passing below the parallel of Angora, through formations of red saliferous sandstone, is quite accurate.

The sun's mer. alt. to-day gave the lat. 40° 50′ N. The Kizil Irmák W. 700 yards distant; the pass in the mountains S. 50° W.; and village of Kíjanlák N. 12° W. ½ mile. On quitting the river's side we crossed some hills of trachytic rocks, and

* A'tó-sú, or Aïtó-sú (A'tó, water), is some local name. The common Turks name their rivers from the neighbouring town, and consequently the same river has frequently several different names.—F. S.

descended into the valley of Hamám Gözí (Warm-bath's eye), so called from warm springs situated at the head of the valley. This valley contained two villages of Turkománs, the first of that nation we had met with in proceeding southwards. At one of these (Mujtelí) we stopped for the night. It is remarkable as containing some fragments of modern Greek buildings, columns, hewn stones, &c.; and in the side of a fountain there is a tombstone with scollop shell, a pilgrim's crook, and a deacon's badge, such as are used by the modern Greeks. Half an hour farther on was a village of Greeks, called Rúm Köi.

Nov. 18.—We approached Kirk Delím by a narrow pass in limestone rocks, in which were several caves; and on the eastern side was a large tomb hewn out of the solid rock, like the tombs of the kings of Pontus at Amasia. This huge relic of human labour was at a height of about 100 feet above the valley, and cut into the side of a precipice which fronted the N. It consisted of a hollow stone-coffin, hewn out of the solid rock, with which it was still connected at the top, but separated at the sides by a passage 4 feet 9 inches in width, and 31 feet in depth, but crossways, at the base, was 44 feet 9 inches. The tomb was ornamented with two lateral pillars, in low relief, and could only be entered by a small aperture about 4 feet high, and 15 feet from the ground; the total height being about 30 feet, and the width 44 feet 3 inches. Above the aperture was inscribed in colossal letters—

ΙΚΕΣΙΟΥ*

Some of the letters were painted red; and it is probably to the modern Greeks of Rúm Köï that this monument is indebted for the inscription, as well as for the addition of a red cross and some rudely-painted letters.

Our ascent up Kirk Delím took us exactly one hour, when we attained an elevation of 3090 feet, and from which point the country soon extended in a high alpine plain, with a small lake, and in good part cultivated. The land gradually lowers beyond this to the great plain of Chúrúm, which, in its lowest part, is only 730 feet below the crest of the Kirk Delím. The intervening country is destitute of wood, thinly peopled, and dreary in aspect, but in parts cultivated by different crops in rotation. The sun's mer. alt. gave the lat. 40° 37′ N.; the Castle of Chúrúm bearing S. 30° E.

The Kirk Delím mountains have a nucleus of mica slate, but are composed principally of trachyte, earthy, compact, and pyroxenic, and of superimposed and tilted-up limestones. The chain is well wooded in parts with oak and pine. It extends from

* "Of Icesius."

the Kizil Irmák, in the W., to the hilly district containing the silver-mines W. of Merziván, which by its southern branches separated Pontus from the Trochmian Galatia (Strabo, p. 561), and is considered by Rennell as a spur of Paryadres. But although from the plain of Merziván it has somewhat the appearance of a distinct chain, from so elevated a plain as that of Chúrúm, it loses its mountainous character, a circumstance which also applies itself to the Köseh Tágh, which, like low hills when seen from Chúrúm, descend, on the western side, down to the valley of the Kizil Irmák, upwards of 1500 feet in a few miles. As Chúrúm has been visited lately by Col. Chesney and Mr. W. I. Hamilton, it need not therefore detain us long. The number of houses is said to amount to 1800, but they are generally of one story, and the population can scarcely be estimated at more than 7600. There are four kháns and as many baths, and we counted sixteen minarets from the castle. There are but few Christian families, and these are chiefly tilemakers and potters; there are also tanners at the place, and much wheat is sold in the market.

The castle, of which we made a plan, is nearly square, walled round, with towers at the angles, and two square towers between these on each side. The interior is occupied by dwelling-houses; the walls are of various dates, and have often been repaired or rebuilt, the original plan of the building having apparently been preserved. The principal stone is a fine compact white limestone, but an easily disentegrating sandstone has also been used. A great number of white marble columns has also been been worked into the wall, besides many Greek tombstones, with crosses and sculptures, and various inscriptions, most of which are illegible. We copied one of the most legible, near the gate. The lat. of Chúrúm, by the sun's mer. alt., was 40° 31′ 47″; and the long. by chron. was 34° 51′ E.; the mean of the bar. was 27·374, indicating an elevation of about 2360 feet.

Chúrúm, after the subjection of Chapván O'ghlí (the well-known Turkomán chieftain of Yúz-kat) was made the seat of a pasha, but soon sunk, from its want of resources, to a mere 'Ayyánlík, under which are Sáz, 'Osmánjik, Hájí Hamzah, Iskelíb, and Kasár: the two latter are towns unknown to Europeans.

Crossing the plains of Churúm in a north-westerly direction, we approached the foot of the Kösch Tágh, which we entered by a valley planted with gardens and vineyards, and then ascended till we reached an alpine plain covered with pine, and having a village upon it. Beyond this we passed over the crest of the ridge at an altitude of 3330 feet, and then began to descend, passing a guard-house in our way. The sun's mer. alt. gave our

lat. 40° 33′; and immediately beyond this we first entered upon beds of gypsum, which gave origin to a low, undulating country, with wide, grassy plains or nearly level uplands, occupied by migratory Turkomán tribes, and filling up the valley of the Ḳizil Irmáḳ from the pass in the Ḳirḳ Delím to the igneous rocks of Ḳal'ah-jiḳ.

The formations of the Kösch Ṭágh consisted of carbonaceous rock, &c., with altered limestones, and on the west declivity gypsum. It would be out of place here to enter into the detail of the mineralogical peculiarities, which we observed in these mountains: suffice it to remark that the various associations of the rocks are highly interesting. A short ride from the place where we entered upon the gypsum pasture lands, led us to the banks of the Ḳizil Irmáḳ, which we crossed without delay in a ferry-boat, and turned to the N. by W., the table mountain of Bayád bearing N. 65° W., and the pass of the Ḳizil Irmáḳ, through the Ḳirḳ Delím, N. 65° E.: we crossed similar marshy and grassy lands of gypsum till we arrived at the foot of the hills of Iskelíb. There was a great variety in the vegetation of these tracts, more especially with respect to that interesting point the social propagation of the same tribes; and it was evident that, as in the plains of Syria and Mesopotamia, a predominance of *Compositæ* and *Umbelliferæ* characterized the autumnal vegetation, and that one or two species had generally a large local development to the exclusion of others; and that these predominant species differ from the slightest variation in the soil and position. The season of the year, however, precluded any very accurate researches of the kind, except to an experienced botanist.

Leaving the plains, we entered into a small valley enclosed by rocks, chiefly cultivated with vineyards: volcanic rocks began now to protrude through the gypsum, and were succeeded by volcanic tufa, and conglomerates, dipping N.E. The castle of the town of Iskelíb, most singularly placed, then broke upon us, occupying the summit of a conical hill of white limestone embosomed in the centre of naked volcanic rocks and conglomerates, the barren and stony declivities of which gave little promise of ever becoming the site of a town. Minaret after minaret, and houses crowding from the deep valley up the rocky side of the hills, gradually opened upon us till they were seen sweeping circularly round the castle, almost as far as the eye in the dusky eve could reach. It presented the very remarkable picture of a town perched upon a naked rock; but the gardens in the bottom of the valley were productive of all sorts of fruits, although wood was rare.

Nov. 21.—Iskelíb, commonly pronounced Eskilúp, contains

1500 houses, chiefly of two stories in height, with tiled roofs: of these about thirty are within the castle. The remainder of the town is much scattered through the valleys round the castle, each of which is watered by its own rivulet, and when not occupied by buildings converted into fruitful gardens. The number of houses was obtained from the Shehr Kayásí* by Mr. Rasám, and the population may be estimated at 9000.

The castle or hill-fort is an old structure of irregular form, and very much dilapidated. The remains of towers at the opposite angles are still evident. The gateway and most of the walls have been repaired in modern times. At the southern foot of the rock on which the castle stands, and fronting the centre of the town, are several sepulchral caverns, two of which have some claims to elegance, being ornamented with sculptures: one of them is much mutilated, but upon the other two winged angels are clearly discernible, the one bearing a round cup, the other a branch. These two grottoes have also each of them two columns of incongruous orders, and, with the sculptures, are indifferent in execution, and evidently of the lowest Empire.

This town, like Ḳánḳarí and Ḳal'ahjiḳ, notwithstanding its size, its castle and antique remains, is in so secluded a spot in the centre of a mountain district, that it did not appear to have been visited by Europeans; and some jealousy was shown on our reaching a place where no Christian subjects of the Porte are allowed to take up a permanent abode. The few Rayás† that pursued their avocations here lived in the kháns, for by a law peculiar to the place, founded upon some superstitious notion, no Christian is suffered to live there for more than nine months in the year. Their wives are consequently left at Ḳánḳari.

The weather was cloudy, with rain, during our stay at Iskelíb, and did not allow of any celestial observations. The mean of the barometer was 27° 348; mean temp. 51½°. Elevation about 2300 feet.

We quitted Iskelíb in a dense fog, and after about an hour's ride we left the igneous rocks, and came upon upland gypsum, bounded to the W. by a hilly range, the central portion of which, with conical summits, was covered with a thin vegetation of pine-trees. At 6 miles from Iskelíb we passed a large Ḳayá Aghzí (Pass's mouth), the weather had cleared up a little, and 2 miles farther, we came to the valley of Cháï Kóï (River-town), which brought us nearer to the foot of the hills where large beds of pitchstone and pitchstone porphyry hills appeared among trachytic rocks. Ascending the next hill, a singular,

* Shehr ketkhudá-sí, pronounced Shehir kyayá-sí, *i. e.* Deputy Governor of the town.—F.S.

† Properly Ri'ayah, or Ri'áyaṭ, spelt Ryoṭ by the Anglo-Indians.—F.S.

naked rock presented itself to our view, beyond and on the southern side of Kizil Irmák, isolated upon a plateau of gypsum, and bearing E. 65 S. We could not divest our minds of the idea that this was a castle, occupying the site of Stabium, which we must have left, although sought after diligently, very little to our left, on our road from Chúrúm to Iskelíb: the natives, however, knew of no castle in that direction, but the intervention of the river renders the intercourse very small. After a journey of about 15 miles, we came to the valley of Bayád, in which are four villages; on the side of the hill, Depeh; at the head of the valley where we passed the night, Naháden; 600 yards below, Yátikchí; and high up on the hill side to the W., Urulán, a small village. The four villages are united under the name of Bayád; and that of Naháden is enclosed by a dyke of pitchstone porphyry, running E. and W. in a kind of recess, while a small river coming from the hilly range flowed nearly from N. to S.; over it was a bridge with some appearance of former solidity, if not antiquity; and near the mosque of Naháden was a mass of pitchstone porphyry hewn into a singular form, similar to that of a baptismal font. On the summit of a hill close to Naháden, and separating the recess in which the village stands, from the upper valley of the river, were the rude walls of an old hill-fort, which must in its best day have been but a very rude structure, not improbably a stronghold of Gallo-Grecians. It is also said that there is a castle one day's journey N.W. from this place.

Nov. 23.—Our route lay over a country nearly similar to that of the previous day. Alternating hills and valleys in the gypsum formation bounded to the W. by hills of sandstone. At a distance of about 6 miles from Bayád we approached these hills, in the narrow valleys opening from which were several Turkomán villages. The sun's mer. alt. gave our lat. 40° 34′ N. Beyond this we came to a deep ravine with a guard-house, succeeded by a dreary upland of unproductive gypsum, terminating in a valley of sandstone, and the village of O'lájik, where we stopped for the night. Here a change of soil is accompanied by fertility.

Nov. 24.—We started in a W. by N. direction, over cultivated lands, followed by plains of gypsum, varying our direction till we arrived at a spring at the head of the valley. Here we sent on our driver with the baggage-horses to Kánghari,* while we ourselves turned to the S.W., by the village of Belí Bágh, descending into a deep valley composed of alternating beds of red sand sandstone and gypsum, among which there was a mine of salt which we had some difficulty in finding.

* Or Kánkari. Pronounced vulgarly Chángri; this substitution of the sound of *ch* for *k* is common among the Arabs S. of Basrah. See Niebuhr's Travels, Vol. ii. —F.S.

This mine occurs in clay beds in the gypsum, at an elevation of about 2500 feet above the sea, dipping about 70° to the N. The entrance fronts the S.: the slope varies, but mules go to the bottom of the mine with facility, and return loaded. The width varies from 7 to 28 yards, and the height from 4 to 6 yards, the works being carried on without order or regularity. The inclination at the bottom averaged 1 yard in 17. The total length was 400 yards; the direction very winding. There is a superintendent who receives from 1 to 1½ piastres per load: the people who come for salt have to dig for themselves. This salt, like that of Persia, which is found in formations of the same character and age, is remarkably pure, and in homogeneous masses, more or less transparent.

Salt is procured from other mines in this neighbourhood, but this is by far the most extensive bed. It is also procured in summer in the neighbourhood of Ḳánḳarí from a small lake, round which the salt crystallizes when the water evaporates. The therm. indicated at the bottom of the mine a temp. of 23° cent., (73½°, Fahr.), the temp. of the external air being 13° (55½° Fahr.). The miners were working almost in a state of nudity. Their hammers were attached to very thin and flexible bars of wood, upwards of 3 feet in length.

The gypsum of Galatia resembles in its characters the gypsum of Paris in part, and still more closely that of Mesopotamia and Arabia. But laying aside the question of the division of that great formation into two distinct portions, there is little doubt but that the gypsum of Galatia or of central Anatolia belongs to the supracretaceous epoch.

The saliferous red sandstones, which are beneath the gypsum, and which constitute the great range of the Ḳánḳarí hills, are, with the gypsum, broken up and altered by the eruption of trachytic and volcanic rocks, as in the neighbourhood of Iskelib; and the lower beds of the same formation are composed of a rudely-aggregated mass of trachytic and volcanic rocks, with chlorite and jaspers; so that on first investigation it appeared like a mere local breccia. It was only after examining the development which the same formations subsequently took in the hilly districts of Galatia, where the red sandstone conglomerate passes into red and brown slaty sandstones, together with red sand and saliferous clay, and occupies large tracts of country, that the real importance of the formation declared itself, and it appeared as a part of the same saliferous sandstone which Mr. W. I. Hamilton met with between Yúz-ḳát and Aḳ-serái, and to which he called our attention, as the sandstone through which the Ḳizil Irmáḳ flows between Angora and Ḳaïṣariyyeh.

Now, it is important to remark that although this sandstone,

like most saliferous deposits, contains few fossils, and that its age is difficult to determine, that still in their upper beds they alternate with the gypsum and its marls and clays; and this alternation in the low country near the Kizil Irmák, between Kánkarí and Iskelíb, is repeated as often as twenty or thirty times, establishing the contemporaneous origin of at least a part of these formations, as well as their almost immediate succession and close relation to each other: if, therefore, the gypsum can be demonstrated to belong to the tertiary epoch, so also must the accompanying sandstone and trachytic conglomerates; a result which will establish a further relation between the formations of the uplands of Asia Minor with the plains of Mesopotamia, Arabia, and parts of Persia and Syria. The non-occurrence of cycladic limestone, or lacustrine marl associated with the gypsum in south-eastern Galatia, cannot be properly considered till we have a more perfect acquaintance with those formations.

A couple of hours' ride over upland gypsum led us to a broad valley, crossed by a rivulet coming from the N. a little E., and met by another valley of less extent, having its rivulet coming from the N.W. The town of Kánkarí, of considerable extent, occupies the base of a promontory of breccia, which advances between the two valleys, and is crowned by a ruined castle, the interior of which is filled with dwelling-houses.

Nov. 26.—Kánkarí is, as just mentioned, a large town, containing about 3000 houses and a population of 18,000 persons. Out of these there are 30 Greek families and 16 Armenian. The Greeks have a church dedicated to St. Obadias: the Armenians have no place of worship. The Mohammedans have 8 large and some smaller mosques; there are 6 kháns and 4 public baths; the chief trade is in salt and wool; red berries* are also an article of trade. The town is built like Iskelíb at the junction of two valleys, but is all grouped, at the southern foot of the hill, on which the castle stands, in one large and irregular mass, only diversified by a few buildings placed apart, as the new barracks are which occupy a low and unhealthy position in the bottom of the valley, whilst a fine natural plateau, out of reach of malaria, exists close to it. Another is a singular Mohammedan building, of which we made a plan. It is called the Mejíd Tásh or "glorious stone,"† and appears to have been a convent of dervishes and a burial-place for holy men. It was said by a resident dervish to have been built in the time of Hárún el Rashíd, but an inscription on it shows that it dates from the reign of the Eyyubite sovereigns of Syria, and John Lascaris at Constanti-

* Probably *yellow* berries (*rhamnus tinctorius*).—F. S.

† There is probably some mistake here, as such a compound is very unusual.—F. S.

nople, not long before the overthrow of the Khalifate by the Moghuls.

At Yaprákli, 6 hours from Kánkari, 1 from Túelit, and 10 hours from Tósiyyah, an annual fair is held, which begins on the 17th September and lasts 7 days: it is celebrated over all Lesser Asia. This place is also noted among Christians as being the site of the tomb of the prophet Elias, a rather dubious point, but there are said to be no stationary houses at the place, which is described as being upon a mountain height.

Our stay at Kánkarí was prolonged a few days in order to get some astronomical observations, as we had been disappointed at Iskelíb. The weather was, however, very unfavourable, generally cloudy and much snow falling. We succeeded in getting lunar distances from Pollux; two sets of sun's alt. for time at this place; and sun's mer. alt.: these gave its long. 33° 49′ E., and 40° 35′ 50″ N. lat.: the mean of the barometer was 27.340; approx. elevation, 2350 feet.

Dec. 3.—We left Kánkarí in a dense white fog and hoar frost below: our road lay along the valley of the united rivulets, the north-western of which was 12 yards wide at Kánkarí. Soon after quitting the environs there is no cultivation, except in one small valley, 2 miles below, and then little else but vines and stunted tamarisks. The hills on both sides consist of gypsum, much waved and twisted in its stratification, with occasionally red sand and sandstone. After following the river about 6 miles we turned to the S.W. over a hill of gypsum; descended into the valley of Beg Dúzí; re-ascended, and crossing another bed of upland gypsum, again descended into the valley of Akghorán, which we followed in a S.E. direction. We were much hurt here at seeing some travelling Rayáhs scoffed at and assailed with the most contemptuous language by a parcel of boys and children. One more bed of upland gypsum brought us to the valley of the Túnáï river, which there is reason to believe comes from the mountains about Yaprákli. It is a small stream from 12 to 15 yards wide, which empties itself at a short distance from that point into the Kizil Irmák. The valley was about ½ a mile wide in some parts, less in others, and there were two kishlás or winter villages, one belonging to the people of Akghorán, the other to the villagers of Inánduk, whose actual residence we soon observed at a short distance up a small valley to our right. Travelling up the valley of the Yaprákli river in a direction of S. 70° W., we arrived in little more than an hour's time at Túnáï, a small and dirty village, inhabited by guards, who are required for the protection of travellers at the time of the Yaprákli fair.

The fog had continued all day almost without interruption; at times we rose above it, on the high uplands, where the sun was seen through the mist; towards evening the effect of the colour of the sky, by the decomposition of the least refrangible rays, gave to the cliffs above Túnáï a beautiful and remarkable appearance. At daybreak next morning the sky was clear, the ground covered with hoar frost, and the summits of the neighbouring hills tinged with the first rays of the rising sun; but a dense bank of mist lay along the valley: in a few minutes the diffusion of vapour became general, and everything was wrapt in a fog, which continued more or less all day, only clearing up at intervals, but never leaving the sky cloudless.

Dec. 4.—The air at an early hour was cold, and our progress cheerless in a fog which scarcely permitted us to see the objects around; but had it been clear, there would have been little variety, for after leaving the valley we came upon a level upland of gypsum, on which for 4 miles there was only one stone, which birds had perched upon and whitened with their dung.

This character of country was, however, soon interrupted by the occurrence of igneous rocks which had broken the upland into fragments, leaving solitary round or conical hills with narrow valleys and passes between them, which became more extensive as we re-approached the gypsum: in these valleys there is either pasturage or cultivation. To the left was the large village of Chándur, before us a narrow rocky pass, beyond which a herd of camels were browsing or reposing with their heads towards the place of the sun, which was not visible, while to the extreme right was the village of Ḥájí Köi, backed by low hills, and to the left igneous rocks and gypsum stretched down to the banks of the Ḳizil Irmaḳ.

Crossing a more level country about 4 or 5 miles, with the remarkable conical hill, on which the castle of Ḳal'ahjiḳ * is placed, bearing S. 32° W., we arrived at that town, and were kindly received in the Christian quarter.

Ḳal'ah-jiḳ is remarkably situated at the base of an isolated and nearly conical hill, upon the summit of which is a fine old castle filled with dwelling-houses, which in some places assist in forming part of the walls: upon closer examination the castle is found to be in a very dilapidated state: still, from the precipitous nature of the rocks on most sides, and its own strength, it must in ancient warfare have been a very strong place. The remainder of the houses are congregated round the base of the hill, which the town completely encircles, and, except on the southern side, it scarcely extends beyond the base, nor

* Ḳal'ahjiḳ (little castle).

above a certain height up its sides. This place, which was sacked at the time that Ibráhím Páshá came to Angora, is now in a state of great poverty and partial ruin. It is said to contain 800 houses of Mohammedans and 60 houses of Armenian Christians, 5 of which contain 2 families. The town is divided into 14 maḥallahs or districts, each of which contains a mosque: there is but one khán and one public bath. The Armenians have a tolerable church, dedicated to St. John the Baptist, and in the neighbourhood are the ruins of an old monastery.

The circumstances which led to the partial destruction of this town were a general rebellion against their governor, Ḥájí Aḥmed Bey, on the occasion of his levying an oppressive tax. The governor was besieged in his own house: a swivel was brought down from the castle, but having been found useless, the house was set on fire, and the governor (whose brother was at the same time governor of Ḳánḳarí) was ultimately killed by the populace. They then placed themselves under the protection of Ibráhím Páshá, who sent hither 4000 soldiers under Ḥasan Yárdahchí. The Turks, however, were enabled to send 10,000 troops from the ḳádílik of Ḳurán, and the result was that the Egyptians, having a smaller force, were obliged to retreat, and the unfortunate town was exposed to a most severe retribution.

Dec. 5.—At 2 h. 26m., A.M., there was a shock of an earthquake, which threatened to tumble about our ears the house in which we were lodged. The movement was in undulations and not irregular, and the house rolled for a second or two like a ship at sea: the sensation was equally unpleasant, while the mortar falling from the rafters and dirt coming down the chimney, with the strain which the building underwent, gave a momentary alarm, but nothing fell near us, and there were only two houses thrown down in the whole place. The dogs began to bark in every direction, and people were running about half naked with lights in their hands. This first shock was followed shortly afterwards by a second, but so feeble as to be scarcely felt. The barometer, a few minutes after the first shock, stood at 27.588 in.; at 6, A.M., it indicated a fall of .056: the ensuing day was as cloudy and misty as ever.

At 2 h. 35 m., P.M., we had another slight shock, rather circularly undulatory; bar. 27.456, ther. 51°; no wind, but cloudy. 8 h. 46 m. a fourth slight shock: bar. the same.

Dec. 6.—At 8 h. 17 m. and 10 h. 26 m., A.M., an irregular rumbling shock: bar. stationary. At midday the weather cleared up a little, and we could distinguish the castle for the first time since we had been here.

Dec. 7.—2 h. 35 m., A.M., a rather rude shock: bar. 27.550; ther. 49°: mist as usual. There was no wind, and the weather

was calm both before and after the shocks: there was only upon one occasion a distant rumbling noise that accompanied the shock: there was not the slightest odorous exhalation perceptible, at least where we were. The effect upon the soil was imperceptible, nor could we hear of its affecting any of the neighbouring springs. The electrical condition of the atmosphere must have been, from the previously described state of the weather, subjected to great tension and great extremes, but we had no portable instruments to determine the extent of this phenomenon. On the night of the 3rd of December Mr. Russell had noticed a large meteor shooting from N.E. to S.W. We endeavoured to observe the direction of the oscillating wave by means of a basin filled with water, but the indications were unsatisfactory: to the feelings of all of us, however, the direction appeared to be from N.E. to S.W., which coincides with the direction in which the igneous rocks of the country have extended the line of their upheaving force, and is the same as the direction, not of the dip, but of the beds of the sedimentary formations.

The rock on which the castle and town are built is a trachyte. The only observations we got at Ḳal'ahjiḳ was an altitude of α Polaris, which gave its lat. 40° 9′, and one set of evening sights, which gave its long. by chronometer 33° 35′ E.

However interesting it might be to watch the phenomena of an earthquake, we were not at all sorry at leaving this unstable place, on which the fog lay as thick as ever, but when we ascended the hills to the S.W. and got above it, we found that it occupied chiefly the valley of the Ḳizil Irmáḳ and some of the adjacent cold uplands of gypsum. At about 4 miles from the town we met, among the various igneous and altered rocks which we crossed, a remarkable and interesting formation of vitrified schist.

On our right we had a mountain now partially covered with snow; and passing by a guard-house, we stopped a little beyond it, to take the sun's mer. alt., which placed us in lat. 40° 1′ N.

As this place is said to be infested by robbers, we were somewhat alarmed by the appearance of two horsemen armed with pistols, who came suddenly upon us; but when they saw that we were prepared to give them a warm reception, they left us unmolested.

A few miles beyond the guard-house we found the remains of a poor wretch who had been impaled there eight months before. Three other individuals had been impaled, at the same time as this miserable being, at Angora.

We descended from this point among rocks abounding in partridges, into a picturesque glen, at the head of which was a village where the robbers who rendered this district so insecure

in part took up their abode. The country after this began to improve, some cultivation showed itself, and we arrived after a journey of 18 miles, at the large village of Hasan O'ghlán, inhabited by Turkománs, who are pastoral, and whose women make carpets.

Between the valley called Dereh Sheïkh, beyond the impaled man and the village of Hasan O'ghlán, we had crossed the line of division between the Kizil Irmák and the Sakáriyyeh. At the last-mentioned village there is an abundant spring, the water of which flows by Angora into the river of Ak Köprí. A hilly district, called Hasan Tághí, bounds this valley to the S., and extends eastwards to the banks of the Kizil Irmak.

The distance of Hasan O'ghlán from Angora is about 15 miles, the heights of Hoseïn Ghází * bearing from the village S. 77° W. There are numerous fragments of ruins at Hasan O'ghlán, more especially wrought stones, columns, and capitals, but we found no inscriptions.

The soil for several miles is here composed of primary schists. These form the hill slopes and undulating country on which large flocks of Angora and other goats are pastured. This line of country is interrupted by Hoseïn Ghází, a lofty dyke of trachytic rocks, which, for miles in width, has altered the adjacent formations, and extends either in continuous masses or detached eruptive dykes and veins. Of the former is the Bághlún or Baulus Tághí, the Mount of St. Paul, an upland district with a rounded outline and occasional cliffs, extending to the N. of Angora. Of the latter are the hills of Angora, four in number, on one of which stand the castle and town: the second is called Khedrelez, or St. George,* and has on its summit a modern sepulchral chapel and ruins, supposed by some travellers to have belonged to a temple of Jupiter: there are also two smaller hills to the north.

There has been some discussion between two travellers * whether or not the castle is commanded by an adjacent height: Kinneir affirming the fact, Brown denying it. The hill upon which the castle is situated is separated from that of Khedrelez by a narrow ravine, which is about 100 yards in width, and contains the rivulet of Tabhanah (corrupted from Debbágh Khánah Chái or Tannery river). The height of the castle above the valley, by our measurement, is 432 feet. The hill of Khedrelez is higher than the castle by a few feet, and the distance of the two crests is about 270 yards.

The rivulet of Tabhanah comes from the S.E., and at its passage

* J. N. 643.

† Khedrelez, a colloquial corruption of Khidr Iliyás or Khizr Iliyás, is the name of a Turkish saint and hero, confounded by the Turks with St. George and the Prophet Elias.—F.S.

‡ Bell's Geography, vol. iv., p. 119.

between the castle-hill and that of Khedrelez, has been dammed in by a strong work, which was also defended by towers, coming down from the castle (of which there are also others defending every possible rocky ascent), and connected by a wall which is carried over the next hill. Flowing onwards circuitously between Ajit Tághí and Khedrelez, the rivulet curves round to the S. of W., is partly lost in irrigating the vegetable-gardens of Angora, and then flows N.W. till it joins the Chibúk Sú, immediately below the bridge of Ak Köprí (White Bridge), a modern structure, misnamed, with respect to its colour, but reposing upon blocks of an older and better construction. The Chibúk Sú, so named from a village where pipes (Chibúk) are made, flows along a narrow valley of trachytic rocks, where are many farms (Chiftlik) and gardens, till it enters the valley of Angora, a mile above the monastery of St. Paul, and ½ a mile farther passes under Ak Köprí, N. 50° W. of the castle summit. The united stream is only 10 yards in width by about 2 feet in depth, but contains a good deal of fish.

It is needless to enter into details concerning the modern town of Angora, formerly Ancyra, and a city of considerable note in all ages of history. It has been visited and described by many travellers of ability, who have left little that is new to be explored.

Pococke and Tournefort have described the remains of Roman architecture, among which stands foremost a temple in honour of Augustus, of which the Latin inscriptions were copied by Pococke, and those in Greek by Mr. W. I. Hamilton, and copies are also said to exist in the Vatican at Rome. Several massive but irregular ruins of temples, guard-houses, or other public buildings, besides numerous inscriptions in the castle, and some rather rudely sculptured lions, belong probably to the Roman era, if they do not also illustrate partly the state of arts among the Galatians; but of that period few, if any, well authenticated remains appear to have been found.

Remains of Byzantine architecture are by far the most frequent: a column of little pretensions to beauty, and which imagination has dedicated to Lainius, the conqueror of Maximin; numerous sculptures in the walls of the castle; some inscriptions, and various Greek tombs and monuments, illustrate this period. Mr. Hamilton laboured hard among these interesting relics, and it is to be hoped that his researches will assist in elucidating the history of Angora.

Amid ruins of a more modern date are the castle as it now exists, a church of doubtful antiquity, and a subterranean viaduct of some extent; and in a small castle which occupies the highest part of the castle rock, are some old coats of mail of rude fashion and execution.

The modern town of Angora is divided into eighty-four

quarters, each having its great mosque or jámi'. There are from seventeen to eighteen kháns; and only three Hamáms. There was formerly a handsome bezestán or market for fine goods, but it is now in ruins. The reports of various travellers concerning the population of Angora vary from 20,000 persons to 100,000, which is not surprising considering the difficulty of obtaining correct information. The kádí, chief justice of the place, whose authority upon such a point ought to be considerable, estimated the population at 54,000, of whom 5,000 only are Christians. But it may be doubted whether the Turks themselves keep any correct account.

From the Christians we obtained an estimate which came to nearly the same thing, 8,000 houses of Mohammedans, 3,200 Armenian Catholics, 1,200 Greeks, 800 Roman Catholic Armenians (called schismatic by their brethren), and 300 Jews. This estimate appeared to all of us to be nearly one half above that of the probable population. According to an Armenian doctor long established in the town, the population consists of 10,000 Mohammedans, 5,000 Christians, and 200 Jews. It appears from the new commercial arrangements entered into between Turkey and Great Britain, and the internal reforms that have been projected in consequence of this by the sublime Porte, that a regular statistical report of the empire is intended to be made as preliminary to other internal changes.

The length and softness of Angora goats' hair is evidently to be attributed to an extreme climate. Cold winters (complained of by Manlius; and in the latter part of December, 1838, we found the snow upwards of a foot in depth, and the minimum temperature, − 16° cent., or + 3° Fahr.) have everywhere the effect of lengthening the hair or fleece of animals, or of supplying them, as in the uplands of Thibet, with an under down; while the hot summers give to the hair its silky lustre and softness. It is remarkable that not only the cats, but also the shepherds' dogs of the Angora breed have long and fine hair. That well-known breed of cats has lately much diminished, their fleeces having been used to adulterate furs. The circumscribed limits generally assigned to the country of this breed of goats are, as far as we have yet seen, correct: they are not met with to the E. of Kizil Irmák. The quantity of wool annually exported amounts, it is said, to 500,000 ókahs, but of this only 200,000 ókahs, or about 500,000 lbs., are of the more valuable fleece.

The other articles of commerce are yellow berries, the fruit of the *Rhamnus catharticus*, which is much cultivated, more particularly in stony places, as on the hills of St. Paul, and even on that of Khedrelez. The amount of produce is stated at 25,000

lbs. The roots of madder (*Rubia tinctoria*), for red dyes, mastic, tragacanth, and other gums, also form articles of commerce, as well as wax and honey. But the chief trade is in wool, merino twist, and goats' hides. The demand for British goods and manufactures is universally admitted to be very considerable.

The older European commerce of Angora was always very great. The tombstones in the burial ground of St. Paul's attest how many of our countrymen must have been engaged in it. It is difficult to account for its decline, unless from the want of success experienced, or from unwillingness to open communication in a place where consular protection has been abrogated now for a period of fifteen years. Almost abandoned by both English and French, who have now only a few native agents in the place, the Armenians have had the courage to establish a house of their own in London. When the Oriental question is settled, and tranquillity ensured to the country, there is little doubt but that commerce will spring up anew; and with the more activity as the resources of Anatolia, and of Western Asia in general, will be made better known.

The longitude of Angora was determined by lunar distances; and by two sets of observations with chronometers, to be 32° 50′ E. of Greenwich, and the latitude by mean of two mer. alts. of the sun 39° 56′ 30″ N. The mean of the barometer was 26·922, giving an approximate elevation of 2,750 feet. The variation of the compass was 9° W. The magnetic intensity of the earth's surface was also observed.

[Mr. Ainsworth's MS. is accompanied by a map of his route, in eight sheets, on a scale of an inch to four miles; by a plan of Heraclea; with several plans of castles and other buildings by Mr. Russell; an itinerary by Mr. Pulsford from Za'farán Bólí direct to Angora; numerous inscriptions, and a list of the names of places in the Arabic character, with their explanation by Mr. Rasám; and also the whole of the astronomical observations on which the several positions depend, as laid down in the map.]

X.—*Notes on a Journey from Jerusalem by Hebron, the Dead Sea, El Ghór, and Wádí 'Arabah to 'Akabah, and back by Petra; in April,* 1838. By the Count De Bertou.

Jerusalem.—After having visited Jericho and the northern end of the Dead Sea; also the monastery of St. Sabas, the Mount of the Ascension, and other remarkable spots in and around the Holy City, we left it on the morning of the 28th March, 1838, and, following the usual road in a general S.S.W. direction, we reached Hebron in the evening; the distance being about 22 miles.

April 1.—During the last three days we were occupied in examining the ruins of the ancient town; in sketching the mosque in which the tombs of Sarah, of Abraham, and of Jacob, are said to be found; and in making a bargain with the Arabs of the Jáhilí tribe,* to conduct us by the southern extremity of the Dead Sea, through the valley of El Ghór and the Wádí 'Arabah to El 'Akabah, at the head of the Ælanitic Gulf, and back to Hebron, by Petra; this, after much talking and wrangling, they consented to do for 3600 piastres (36*l.*); and at ½ past 7 this morning we started, under the escort of the Sheïkh 'Abdallah.

The road leads in a S. by E. direction, along the side of a hill about 300 feet high, between olive-groves and vineyards on either hand, but after a short distance cultivation disappears, and the country presents the aspect of complete sterility.

At 6 m. we find the vestiges of an ancient road near the Dhahrat el Zíf, at the foot of which are some wells. At 9 m. are the ruins of a castle called by the Arabs Karmel; the superstructure is evidently of the middle ages, but the large and well-cut stones of the foundations would seem to belong to an earlier period. The ruins scattered around mark the site of a town, doubtless that of Carmelia. From this spot the road turns off in a S.S.W. direction, and we shortly came to a rapid descent of 20 minutes, which brought us to the wells of Karyateïn (the two villages), near which we saw the encampment of our Arabs, with their black tents stretching over the plain: to the eastward are the Jebel el Zo'arah† and Jebel Esdúm, being the mountains which form the western boundary of the lake Asphaltites. Esdúm is the Bedowin name for salt, and synonymous‡ with the Arab Milh. All these mountains, we were told, are covered with salt; and our Sheïkh, 'Abdallah, spoke of a large cave in them; but it would have lengthened our journey too much to visit it.

* Called in the plural number the Jáhilíyín, i. e. Jáhilí Arabs.

† This probably should be spelt Zoweïrah, and has no relation to the Zoar (Ṣo'ar) of Scripture.

‡ It is probable M. de Bertou misunderstood his Bedowin informers: Esdúm, or rather Sádúm itself, is evidently borrowed from Christians or Jews.

At Bír el Karyateïn are the remains of buildings, probably an Arab village; 2 miles farther we reached the camp of our Bedowin friends, and were hospitably received by the great Sheïkh Músa Abú Dahúk, chief of all the Bedowins of the mountains of 'Abraham the beloved;' his people, divided into three encampments, live happily under his laws. In summer, they told me, each camp seeks out fresh pasturage for its flocks and herds, which forcibly recalled to my mind that Esau and Jacob separated from each other for the same purpose; at every step in this country one finds a striking resemblance between the account given in the Bible of the patriarchs of old and the manners and customs of its present inhabitants—nothing has changed.

April 2.—After a fresh attempt on the part of the Sheïkh Músa to get more money from us, we started at noon, and, pursuing a general S S.E. direction over an undulating plain, with the grass dried up for want of water, we crossed the three Wádís of El Lobar, El Hadeïbí and Es Sayál, leaving on our right a small hill called Tel-el-'ard. At 8 miles we reached the ruins of Mask Es-sedid, where there are fragments of columns rudely sculptured; crossed the valley of Omm el Budún, and at the end of 10 miles had the first glimpse of the Dead Sea, at the outlet of a deep valley on our left. Descending rapidly over ground covered with salt, and occasionally flints, we passed the cave of Magharat el 'Azírat, and shortly before 6 o'clock encamped in the midst of a country bearing the stamp of the most complete desolation. Nearly opposite to us, on the eastern side of the Dead Sea, a long, low, white peninsula projects some distance to the N.N.W.*

April 3.—We continued our descent in a S.E. direction, over calcareous ground, following the dry bed of a torrent called Wádí Zo'arah. At 4 miles passed on the right, in the precipitous face of a hill, the square entrance of an excavated tomb, named Magharat El Dáhúrah (Deborah's Cave); our Arabs said it was the work of the Franks. At 8 miles we reached the ruined castle of Zo'arah; at the foot of which passes a torrent bearing the same name; tamarisks and acacias cover the ground, and there is a fine view of the mountains of Arabia in the distance. At 10 miles we reached the foot of the descent: here the waters of the Wádí Zo'arah spread out over a plain, called by the Arabs El Nafíleh, from the quantity of shrubs of that name with which it is covered.

From this point we changed our direction to S. by E., and tra-

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* M. de Bertou's MS. is accompanied by a sketch of the Dead Sea, and the mountains on either side, taken from this spot; as also by a drawing of the channel of Wádí 'Arabah, taken 7 miles from its outlet into the valley of El Ghór; and a sketch of the Wádí Gharendel.—ED.

velled parallel to, and within about 500 yards of, the Dead Sea on our left.

In the limestone hills on our right is a grotto named Magháṛát Esdúm (Sádúm), whence gushes a salt stream; the Arabs say that the cave may be followed for some miles. The hills are covered with blocks of salt, 7 feet in length by 3 in depth.

At 15 miles we reached the southern end of the Dead Sea, entered Wádí el Ghór,* which is from 2 to 3 miles wide, and travelled over a plain covered with salt, at the foot of salt-hills; these hills diminish in height to the southward, and form the foreground to higher ranges behind them; they are in every part furrowed by salt torrents, which flow in winter, and inundate the plain over which we were travelling, in a direction a little to the W. of S.

At 20 miles crossed Wádí el Fuḳreh, coming from the hills to the W., and flowing, as well as numerous other streams, to the Dead Sea. We gradually left the salt-hills, and approached the hills to the E., crossing a marsh, in which the water was not quite so salt as before. At 22 m. we reached the chain of low hills, which since the morning had appeared to us the limit of El Ghór, and to close it up by uniting the mountains of salt to those of Arabia. These hills, which are from 60 to 70 feet in height, are of a whitish and very friable sandstone; they form the buttresses or outwork (contreforts) of the desert, which stretches to the S., and is known by the name of Wádí 'Arabah: they are channelled by numerous small streams, which fall into El Ghór, and eventually into the Dead Sea. A little further on we reached 'Ain el 'Arús (the fountain of the betrothed), a warm spring, of the temperature of 95° Fahr., while that of the air was 88°: the taste of the water was a little sulphureous. On looking back, the direction of El Ghór from this spot was N. 15° E. by compass. Here were some dwarf palms. Just before reaching the eastern hills, our guides turned suddenly to the right, and cried out "Wádí 'Arabah, Wádí 'Arabah," and we entered this celebrated valley, which at first had the appearance of the bed of a great river; and, if its slope were not visible towards the Dead Sea, one would exclaim on seeing it, "this is really the bed of the Jordan:" it is, however, the bed of a torrent which flows in an opposite direction, viz., from S. to N., and falls into El Ghór. At present here is no water; its breadth, which is from 250 to 300 yards, is filled with tamarisks, which the camels devoured eagerly; it extends in a S.S.W. direction, and is bounded by almost vertical banks of grey freestone, about 150 feet in height. We halted for the night at 3 miles from the entrance, and hid our camp as much as possible, in order to escape the lynx-eyes of

* Properly Ghaúr.

the Arabs of Kerek, who inhabit the eastern hills which command the Wádí.

April 4.—In attempting to describe the scenes which we had yesterday beheld, I feel the utter inadequacy of words to express my feelings. I had wandered through the Alps, the Pyrenees, and many other mountains: I had seen countries blasted by the curse of the Almighty, the plains of Moab and the land of Ammon, but had hitherto seen nothing to compare with the mountains of Zo'arah and of Esdúm. Here is desolation on the grandest scale, and beyond what the imagination of man could conceive: it must be seen—to describe it is impossible. In this striking and solemn waste, where nature is alike destitute of vegetation and inhabitants, man appears but an atom:—all around is enveloped in the silence of death—not a bird, not even an insect is seen! The regular step of our camels returned a dull sound, as if the earth were hollowed beneath their feet; the monotonous chant of the camel-driver accompanied at times the step of this inhabitant of the desert, but was suddenly stopped, as if he feared to awaken nature. Three Bedowins went before us to examine the road, for we have to fear meeting with Arabs who might be enemies of our tribe. The sun concealed itself by thick clouds, and seemed unwilling to shine upon the land cursed by the Almighty. We saw the traces of several wolves. Everything seemed to combine to make the landscape a scene awfully sublime.

We started at 7 this morning in a S.S.W. direction; the hills on the right are much more furrowed than those on the left. At 8 miles we got sight of the mountains of Nabí Hárún (the prophet Aaron) or Mount Hor, on the horizon, to the south-eastward, offering a picturesque outline. As we advanced, the Wádí became wider, and assumed the aspect of a desert; the hills on each side decreased in height, and the plain seemed to ascend.

At 9 miles the banks of the valley to the left disappeared, and on the right we perceived distant mountains in the S.W. At 10 miles we passed the opening of Wádí Afdel, which comes from the S.E., and shortly afterwards that of Wádí Koseïb (Rush Valley) from the S.W. At 15 miles we halted for a couple of hours at 'Aïn-el-Hafíreh, a small spring of tolerable water for the desert; it is situated at the spot where the road from Hebron to Petra crosses the Wádí 'Arabah. When Moses says, "Then we turned, and took our journey into the wilderness, by *the way of the Red Sea*,"* he certainly speaks of the Wádí 'Arabah;—no epithet can be more applicable—besides, it appears, on examining the configuration of the ground, that Moses had no other road to take in order to go from Mount Hor into the desert of Sinaï; he would be afraid to recross the mountains inhabited by his

* Deut. xi. 1. See also ch. i. 2, 40; Numb. xiv. 25, and xxi. 4.

enemies, and the people, carrying with them their flocks and herds, could not choose a better route; it is a smooth road, of vast width, on which even carriages might travel.

Continued our journey again for two hours, when we halted for the night; the outline of the eastern mountains is highly picturesque.

April 5.—Quitting our camp at 7 this morning, we travelled in a S.S.W. direction, through the valley, which is here about 1500 yards wide. At 3 miles passed on our left a small hill, resembling a truncated cone, called Dubbet-el-Boghlah (Mule's-tail), and shortly after we saw Nabí Músa, (the Prophet Moses,) at a great distance, bearing S.E. by S. At 5 miles we halted at 'Aïn-el-Ghamar (El Kamar?) a spring of the temperature of 15° Cent. (59 Fahr.); both the smell and taste of the water were detestable; but, as we should get no other till the following evening, we were compelled to fill our water-skins. A rock near this spring, of a soft reddish freestone, 70 feet high, is covered with the names, or rather the marks, of the Arabs who pass by this road; we added ours to the number. A female gazelle crossed our path, which the Arabs stopped by imitating the cry of the male. The ground is covered with flint pebbles; all vegetation has disappeared, and the Wádí is gradually lost in the slightly undulating plain, which extends towards the mountains in the E.

April 6.—During the morning we passed on our right the Wádí Ṭalḥ * (Acacia Vale), which extends to the westward, and which the Arabs pointed out to us as being the road to Egypt; in fact it is the route which Burckhardt followed in 1812, when he went from Wádí Músa to Cairo. From the junction of the Wádí Ṭalḥ, the Arabs give the name of 'Akabah (the Ascent) to the southern prolongation of the Wádí 'Arabah, so that this spot would seem to be the line which separates the waters flowing to the Dead Sea from those discharged into the Red Sea. Indeed it is impossible to mistake the two slopes; one to the north, the other to the south. Hitherto we had seen no insects, but now we met myriads of beetles; we also killed a snake with a flat-pointed head.

From this point we turned off S.S.E., the ground still covered with small black flints, and with large but withered roses of Jericho (Anastatica Herichuntina), named nokdaḥ by the Arabs. Shortly before noon, about 2 miles on our left, we passed an encampment of the Bedowins, Ḥasan ibn Jád, min 'Arab el Ḥoweïṭát, at a place called El Ḳá'; and at the same time we had, at a few paces on our right, the tomb of Sheïkh Rejem Abú Dahíj, near which is also a hollow with water in it named Khaṭíb el Ḍhaï'ah. We passed Wádí Sháḍhem on our left, and 2 miles beyond it halted at the

* Ṭalḥ, the Acacia gummifera.

junction of the Wádí Gharendel (Karendel?) with El 'Arabah, [?] while our Bedowins went to fetch water at the springs of Gharendel, about 4 miles distant.

At 5 P.M. continued our journey against the semúm (poisoned) wind, which brought with it a quantity of fine sand with which the plain is covered, and at 7 o'clock encamped for the night.

Continued our journey on the following day by the dry bed of a stream, bordered by tamarisks. At sunrise we had a magnificent view of the mountains of Hormah in the E. At 15 miles halted to get a supply of water at the spring of Ghadiyán, which is strongly impregnated with sulphur. At 3 m. beyond passed a spot named Rejem el hadíd (the iron cast); the valley is spread out into a great plain covered with small gravel of porphyry and granite.

April 8.—At ½ past 9 this morning we got the first sight of the Red Sea. The mountains on either side, which bound the Ælanitic Gulf, have a very picturesque outline; the soil we passed over is furrowed by the dry beds of torrents and covered with tamarisks. We soon after perceived the palm-trees of the Oasis of 'Akabah, and at 11 o'clock pitched our tents in the court of the castle. The luxury of having fresh water in abundance, after having been obliged for eight days to drink water impregnated with brimstone, and exhaling an odour of rotten eggs, and for the last two days even to have occasionally wanted that, is not easily to be imagined by those who have not experienced it; and when we saw a sakká (water-carrier) come to water the ground both within and without our tents, we could not help exclaiming at the apparent waste of so precious a fluid.

April 12.—During a stay of four days at 'Akabah we employed ourselves in sketching the scenery, &c., and in making a journey to Kasr-el-Bedawí (desert castle), about 3 miles from 'Akabah, on the E. side of the gulf. We had intended to have continued our journey to Sinaï, but, finding great difficulty in procuring a guide, &c., we determined to return by Wádí Músa. At noon we quitted the castle of 'Akabah, and, retracing our steps to 'Aín Ghadhyán, encamped there for the night. On the following day turned off in a N.N.E. direction, and came to Wádí Deleghah, whose waters flow towards the Red Sea; the ground here is covered with mallows. Passed the ruins of the castle of Ká' on our left, and halted for the night at the line separating the Wádís 'Akabah and 'Arabah, called by the Arabs El Sath (the roof), or the culminating point.

April 14.—After an hour's journey we reached the channel of the waters of Wádí Ma'áferah, which flow into El 'Arabah; the hills, which here extend E. and W., reach to the eastern mountains, and thus form the separation between the two basins of the

Dead Sea and the Ælanitic Gulf. The track now led among the offsets of the eastern mountains, and we shortly entered Wádí Abú Kasheïbeh and continued along it to the eastward for 2 miles, when we resumed our direction to the N.N.E.; in this valley are almost trees of oleander (Nerium oleander), and abundance of partridges. The ascent became so steep that we dismounted from our camels, and continued our journey on foot, passing round the base of the peak known by the name of Mount Hor, and saw distinctly the kobbeh, or cupola, which covers the tomb of Aaron. Our road now led directly E., through the Wádí Hárún (Aaron's valley), which receives the waters of the Wádí Músa, and then turning N.E. for about 2 miles, we pitched our tents amidst the ruins of Petra.

During a stay of five days among these splendid remains, we occupied ourselves diligently in examining the sites, sketching the temples, and copying inscriptions, and we fully agree with all former travellers in the magnificence of this city of the dead, and can bear ample testimony to the accuracy of M. de Laborde's plates.

April 19.—Quitting Petra at 2 h. 30 m. P.M., we retraced our steps and halted in sight of Mount Hor, where we left our caravan, and, portfolio under the arm, put ourselves under the guidance of Abdallah, and set off to visit the tomb off Aaron.

Mount Hor is a mass of reddish sandstone which rises 1500 feet above the level on which it is placed; there is nothing worthy of the name of road by which to reach the summit; it was by climbing from rock to rock, and after an hour and a quarter of hard work, that we reached the Turbah of Hárún; we entered by the western door the kobbeh or dome which covers this ancient and venerable tomb, and found ourselves in a square chamber 9 yards long by 6 wide, having the roof supported by double arches which join in the middle and are supported by pillars: the first object which struck us on entering was a sarcophagus covered with drapery of painted cloth under which are some green rags: we thought at first that it was Aaron's tomb, but the Bedowins of the country, who had joined our party, said that it was only the tomb of his horse. An inscription in the ornamented Arabic or Kufic characters would doubtless tell in whose honour this tomb was erected, but as night was coming on I had not time to copy all of it:* the Bedowins lighted a lamp, which is left there for visitors, and they conducted us to a small staircase at the N.W. angle of the chamber. We descended fourteen steps and

* Unfortunately, the name of the person who erected this monument is in the three last lines which I had not time to copy; but the form of the character sufficiently indicates that this monument is very ancient. Dr. Lowe thinks of the time of 'Omar.

found ourselves in a narrow dark corridor, about 1 yard wide by 2 long, at the end of which we saw the tomb of the brother of the great law-giver. To describe the various sensations that pressed upon me at this moment, would be impossible; I will therefore confine myself to a brief description of what we saw: the mausoleum has the form of a quarter of a sphere placed on a pedestal; fragments of ornaments in wood, a small stone column, and two copper railings, which formerly surrounded the tomb, and are now hung up to the roof, are the only objects to be seen in this cave. The Arabs, who are always in expectation of finding treasure, have searched the stonework; and broken stones, and even some torn out at the base of the tomb, bear witness to the cupidity of this savage people.

We observed with astonishment that the Bedowins paid more respect to the tomb of the horse than to that of the prophet himself. We returned to the upper chamber, where several capitals and bases of small Corinthian columns are lying about. One shaft of a large column still stands upright behind the sarcophagus of the *furus* (horse), and others similar are visible in the external wall. Who could be the people to erect here a monument adorned with Corinthian columns? The Jews under the protection of the Romans or the Nabatheans?

Two large caldrons are left in the kobbeh for the use of the faithful who come hither to sacrifice to the prophet; one is destined for the offerings of sheep and goats, the other for that of camels; several *ex voto* offerings are suspended to the roof or to the columns of the upper chamber, such as shreds of cloth, ostrich eggs, glass beads, &c. After having seen everything well, M. Montfort, my travelling companion, and I, set to work to make drawings of both the interior and exterior of the tomb; nor did we leave the summit of Mount Hor till half an hour after sunset, and it was not without difficulty that we regained our tent. We had the satisfaction of possessing our two drawings of the tomb: but we are to start to-morrow morning before daylight, as our Bedowins have a dreadful fear of the Haweitát—they are no longer in keïf.*

April 20.—Quitting our camp at Nakbel Robá', at the western entrance of Wádí Hárún, we set out in a N.N.W. direction, passing by the Wádí-el-Robá' into the Wádí el Abyadh (white valley), and thus in a slanting direction across Wádí 'Arabah towards Hebron and Gaza. El 'Arabah is here very wide, and the ground covered with flints. About sunset we halted to fill our water-skins at the springs of El Weïbeh, or El Lúbiyeh,†

* "Good-humour."

† As lúbiyah (French bean) is a Persian or Hindí word, it is not likely that it would form part of a Bedowin name, such being usually genuine Arabic.—F. S.

which form a little oasis of palm-trees and reeds, and half an hour beyond it we encamped for the night, as our Jáhilín feared to stop at the well on account of the tribes in the neighbourhood with whom they are on bad terms.

April 21.—Continuing in a nearly N. direction we crossed not less than ten nameless Wádís, at intervals of as many miles, their dry beds all leading to the equally dry channel of El 'Arabah, about 3 miles on our right; these small valleys abound in thorny acacias. A little beyond, a low range of hills named Jebel el Ḳofáikifeh intervenes between El 'Arabah and our road, which, following their western foot, inclined to the N.N.W. for a few miles as far as Wádí Ḳoṭeïf, after passing which we left about 3 miles on our left an isolated small hill named by our guides Ḳádeseh or El Madárah; the name in this locality is remarkable —may it not be the Kadesh of the Scriptures? The roads to Gaza and Hebron separate here; following the latter, we soon after reached the Wádí Fukreh, which leads out of Jebel Yamen (Right-hand Mountain); this range, which had bounded our northern horizon since the morning, is the beginning of the mountains of Judea, which we now enter by a deep defile, the mural hills on either side rising from 150 to 200 feet; on reaching the end of the valley or gorge, we commence a steep ascent up the mountains, which are about 1000 feet high, winding by a very rough track through a wild and rocky defile, till at the summit we come out again upon an apparent desert. I had hoped and expected a better country: a little beyond this we found traces of vegetation, and halted for the night at the spring called 'Aïn Yamen.

April 22.—Our road this day crossed wide sandy plains, with bushes scattered here and there. After passing the Wádí Mezlíkah, we traverse some low eminences and pass a river named Ḳurnúb on the left; here is a fountain and two fragments of buildings, which the Bedowins say was the work of the Christians. Farther on we passed the Wádí Abú Ṭarfá (Father Tamarisk), a small hill called Ḳubbet el Baul, the ruins of a town, and followed the course of the Wádí Shehábí in a westerly direction as far as a small ruined fort, where we turned due N. This was the route travelled by the pilgrims from Hebron to Ma'án on their way to Mecca at the time that Moḥammed 'Alí forbade them the route by 'Aḳabah.

At sunset we reached our former encampment at Bír Ḳaryateïn, where our Arabs were joyfully received by their own tribe of Jáhilín, but who had now left the valley and were encamped on the neighbouring hills. The Sheikh Músa came forward to give us the Arabic salutation of welcome, Má rabá el Ḥamdu-l'illah! and it was not without a feeling of much satisfaction and pleasure that we saw our tent again pitched in the midst of a

friendly people after an absence of four weeks, and felt grateful for our safe return from a journey of much fatigue and anxiety, not unattended with danger, and in which we had the gratification of knowing that we were the first Europeans who in modern times had traversed the whole extent of the Wádí, from the Dead Sea to 'Akabah, and have proved that, in the present state of things, the river Jordan never could have flowed into the Ælanitic Gulf. On the following day we returned to Hebron.

[It is due to M. de Bertou to state that the above account has been very much abridged from his detailed narrative, in which he gives a very minute itinerary, with compass-bearings nearly every quarter of an hour. These have been made use of in laying down his route in the accompanying map. M. de Bertou also gives some barometric, and several thermometric observations, in order to determine the elevation by the temperature of boiling water; but, as he himself states that his instruments were out of order, it is thought better to omit the results. M. de Bertou's original MS. is preserved in the library for reference.]

XI.—*Extract from a Notice on the Site of Ancient Tyre.* By the Count J. DE BERTOU.

Beïrút, 21*st November*, 1838.

IN addition to the account of my journey from Jerusalem to 'Akabah, I have now the pleasure to present to the Geographical Society of London the result of my researches concerning the site of ancient Tyre. My inquiries were based upon a series of questions proposed to me by M. Poulain de Bossay, of the Geographical Society of Paris,* and I hope some light may be thrown by them on the archæological and historical discussion raised in the learned world on the subject of the ancient metropolis of Phœnicia.

Perfectly aware of the difficulty which exists in making ancient topographical researches without the assistance of an exact representation of the ground, I hoped to do a useful thing in surveying and measuring, with great exactness, the contours of the peninsula upon which the village of Ṣúr is now built, accompanying this plan, made on a large scale, with a second, indicating both the respective positions and distances of the different localities which may have given rise to discussion.

* Bulletin de la Société de Geographie. Janvier, 1838, p. 47.

The questions that I intend to examine are these:—

I. On which point of the continent stood the first city of Tsúr or Şúr, founded by the Şidonians 240 years before the construction of Solomon's Temple?

II. Does the little peninsula upon which modern Şúr is built include all the island upon which Tyre stood before Alexander's conquest?

III. Could the harbours which exist now, even in restoring them to their ancient limits, be sufficiently large for such a maritime power as Tyre?

Following the order of these questions, I will examine, first, where is Şúr to be placed; and if I can only arrive at probabilities, the insufficiency of my researches will be fully explained by the words of the prophet Ezekiel: "Though thou be sought for, yet shalt thou never be found again, saith the Lord God." xxvi. 21.

[I. On a comparison of various passages of ancient writers, M. de Bertou is of opinion that the most ancient city of Tyre was on the continent around, and upon an eminence now known by the name of Marshúķ, where are still some large pieces of rose-coloured granite columns, at a quarter of an hour's distance from the island of Şúr, in which island was formerly the temple of Jupiter Olympius. This temple, according to Dio, was joined to the city by Hiram, son of Abibalus, by raising a causeway. The causeway was again destroyed by the Tyrians in the reign of Nebuchadnezzar, when *they put the sea between them and their enemies* to escape from his arms; and from that time till the conquest of Alexander the inhabitants of Tyre confined themselves to the island.]

II. Does the little peninsula upon which modern Şúr is built include all the island upon which Tyre stood before Alexander's conquest? After having measured the peninsula, I came back to Beïrút, and there having collected all the historical information that I could procure respecting Tyre, I again asked myself the question, how could the narrow space that I have measured possibly afford room for a city so powerful as Tyre? In turning to Rollin's description of the siege of this city by Alexander, I was struck by the passage in which the historian informs us that the besiegers "avaient remparés le pied de la muraille de grosses pierres pour en empêcher l'abord" (Rollin, vol. vi. p. 101); and that when the assailants had taken away these stones, the base of the wall being cleared, the ships could easily approach. Now, at the present day, the peninsula is so surrounded with shoals and rocks that the smallest boat cannot approach it: if the same obstacles had existed in the time of Alexander, this "remparement" of the walls would have been superfluous, and the galleys

of the besiegers could never have come to the foot of the ramparts. This passage opened a door to the probability of an interesting discovery, and I began to think that Maundrell had concluded justly in supposing that the greatest part of the island which Alexander besieged is now under water. I saw a further probability in favour of this supposition in the quantity of pillars which are found upon a rock on a level with the water (*vide* plan No. 9), and for the existence of which on this place I cannot account but upon the hypothesis, that what is at present a shoal was formerly part of the town, and that these columns belonged to a monument, the lighter materials of which, as well as the earth which covered the rock, were swept away by the sea, or rather "scraped," according to the word of the prophet Ezekiel; "I will also scrape her dust from her, and make her like the top of a rock." (ch. xxvi. 4.) This conjecture once formed, I mounted my horse and returned to Súr, in order to arrive at a certainty, and thereby confirm or destroy it. Again on the spot, I took a boat, and soon found, both by repeated soundings and by information furnished by my guides (divers), that a bank of rock existed, which I have indicated on the plan by a grey tint. I do not think that it is venturing too far into the field of conjecture to suppose that this bank of rock, now under water, anciently formed part of the islands which were inhabited after Nebuchadnezzar had destroyed the town situated on the continent. So that the word of the prophet is again literally accomplished.

III. The third question which I have proposed to myself is this: Can the harbours which now exist, even on restoring them to their ancient limits, have been sufficiently large for such a maritime power as Tyre?

As I have already observed, it is impossible, on visiting the peninsula upon which the miserable village of Súr is constructed, not to be struck with the contrast presented by the narrowness of its limits when compared with the grandeur and power of the city which was the parent of Carthage and Cadiz, and whose lofty walls arrested for so long a time the conqueror of Asia. But if the traveller cannot understand how so powerful a city could be crowded into so narrow a compass, his astonishment is still greater when, after having in vain sought for the ports necessary to shelter the innumerable vessels which covered the sea, he only finds miserable basins, which could never have contained more than 250 or 300 small galleys. In the face of such facts one is compelled to doubt the exactness of historians, or to seek by conjecture to reconcile their narratives with the truth. If the discovery of the ledge of rock, which I have before spoken of, the height of the houses of Tyre mentioned by Strabo, and the very natural supposition that this city possessed considerable settlements on the continent, account for the small extent of the actual peninsula,

the other problem still remains to be solved—where are the ports which sheltered the innumerable vessels of this rich emporium?

Perplexed by this difficulty, I ardently sought for a solution, which I did not think afforded either by the extent of the limits of the northern port, as indicated on the plan by red dots, or by the discovery of the southern basin, which appears to me to have been used rather for the construction of galleys than to serve as a port, unless the wall of 25 feet thickness, which incloses it towards the sea, be the remains of that inclosure of 150 feet in height which surrounded Tyre when Alexander came to besiege it; and that the space comprised between this wall and the present shore formerly constituted a part of the city. The shallowness of the basin, and the great quantity of pillars and other materials which are seen under water, render this last supposition in some degree probable. Where, then, is the southern port, designated by Strabo under the name of the Egyptian port? I think I have found it. The sponge-divers, who lent me their boat to visit the shoals which encompass the peninsula, informed me of the existence of a submarine bank which extends to a distance of 2 miles in a S.S.W. direction towards Cape Blanco: this bank being covered by water to the depth of 1 to 3 fathoms, it was impossible for me to ascertain whether it is natural or artificial; that it exists is certain, and that it continues at least 2 miles in a perfectly straight line. I could perceive the bank very distinctly, especially by throwing oil on the surface of the water, and I estimate its breadth, which appeared to be always the same, at from 12 to 14 yards. If this embankment (digue) be artificial and was constructed to form a port, there is no longer any exaggeration possible as to the power of the Tyrians, and the riches of their commerce are attested by this great fact. The space comprised between the shore and this bank would form one of the largest ports known. In order to arrive at a certainty it is necessary to have a diving-bell at my disposal. I have requested the President of the Geographical Society at Paris to petition the Minister of Marine to cause the necessary instruments to be put on board the first ship of war which may come to this coast: then it would be easy to verify the fact. If this bank be artificial, or being natural, if it bear traces indicating that it has served as a foundation for a mole, the discovery appears to possess so high an historical interest that I hope, when known in Europe, some of the powers who may have vessels in the Mediterranean will furnish me with the means of verifying its exactness.

Shoals extend for ½ a mile to the north of the peninsula, and form a roadstead, in which the ships that now come to Sûr anchor: may not a wall have existed also upon these rocks, and have formed a northern port nearly similar to that of the south? These two long moles projecting to the right and left of the island

would correspond perfectly with the following simile, which I find in an Italian translation of Telemachus, and which probably may have been furnished to the Archbishop of Cambray by an historical document:—"Due gran mola simili a due robuste braccia, avanzandosi nel mare, formano un porto, a cui non può recare oltraggio l'impeto de' venti." If this phrase be not a mere figure, it is perfectly descriptive of the two moles, which I have supposed to have existed, and cannot be applied to the small ports, which, far from advancing into the sea like two vast arms, are, on the contrary, indented and almost invisible.

The most minute researches did not enable me to discover any inscription among the ruins of Tyre; I learnt from old men of the country that several marble tablets covered with Frank characters had been removed to 'Akká by Jezzár Páshá when he built his great mosque; and the Arabs, who have a vague idea of the celebrity of the place which they inhabit, added, that these inscriptions were of the time of Alexander. Another *stèlè* was carried off, they informed me, a short time ago, by an Austrian ship-of-war. But information given by Arabs is entitled to very little confidence. I have often experienced this, and very recently I uselessly made a journey of 36 miles in search of an inscription at Rás-el-Musherref, where I found nothing but an uneven surface of rock, discoloured by the action of the sea-water. I mention this circumstance, because it may save a fruitless journey to other travellers who might be disposed to allow themselves to be carried away as I was, by the hope of a discovery.

Except some pillars of grey granite, the greatest part of which are under water, few ruins are seen at Tyre. Alexander, in building the causeway, accomplished the words of Ezekiel, chap. xxvi. v. 12, "And they shall lay thy stones, and thy timber, and thy dust, in the midst of the water." So that all contribute to efface the vestiges of this city, which is to be "sought, not found." It is hardly a century since Maundrell said, "You see nothing here but a mere Babel of broken walls, pillars, vaults," &c. At this day these walls and vaults have disappeared under the sand which is constantly thrown up by the sea, and which would entirely bury the town but for the precautions the inhabitants take every year to secure the ground they occupy against its encroachments.

Altogether the prophecies against Tyre have been accomplished, even to the minutest details, and the best description of its actual state is that given by the prophets themselves.

The numbers of the *Journal des Savants*, of Nov. and Dec., 1835, contain two articles by M. Letronne, in which he critically examines the latest researches on the situation of Carthage by Capt. de Falbe and M. Dureau de la Malle; I find therein striking points of resemblance between the colony and its metropolis: and it may not be without interest to show that the founders of Car-

thage were guided by recollections of their country, both in the choice which they made of the site of the city and in the works which they executed. Tyre was first built upon the peninsula formed by the continent before the junction of the island with it by the causeway of Alexander, and this favourable situation procured for this city secure and large ports (Rollin, vol. vi. p. 90). Carthage was also built upon a peninsula, and the following words, borrowed from Appian, are equally applicable to Tyre and Carthage:—' Carthage was situated at the extremity of a gulf, and greatly resembled a peninsula' (App. Bell. Pun. ch. 95). Tyre had two ports; if they were formed by the two great moles of which I have spoken, they must have communicated by the strait which Alexander filled up. If these two ports were only the two basins represented on the plan, I am of opinion they must have passed from the northern to the southern port by the canal which separated the two islands, these two ports would have the same narrow entrance which we know was closed by an iron chain. Appian, speaking of the two ports of Carthage, says: " The ports were so situated, that it was necessary to pass from one into the other, and that there was but one entrance for both on the side of the sea; this was 70 feet wide and closed by iron chains." By a remarkable coincidence, both Alexander and Scipio constructed large causeways, the former to seize upon the mother, the other to reduce the daughter; and the inhabitants of the two cities, alike despising these works, at first supposed them to be impracticable, and only commenced any opposition after they had witnessed their success. This parallel might be pushed much farther, but I confine myself to pointing out such circumstances as appear to me most striking.

Although I fear I have already exceeded the limits of a letter, I cannot close my observations upon Tyre without mentioning the hydraulic works which the ancients executed at Rás-el-'Aïn, and noticing the prodigious quantity of water furnished by the different sources or subterraneous channels, the produce of which, confined in reservoirs, acquires a level sufficiently elevated to flow against the natural slope of the ground by means of aqueducts, which still exist as far as Marshúk.

There still remain at Rás-el-'Aïn seven reservoirs which furnish water: I will state in a separate note the dimensions of each. The water of the principal basin has been, and still is, employed as a moving power, as is shown by the construction of the basin itself; but one may perceive that it has also been carried by a watercourse to the basin which still supplies the aqueduct which went to Tyre, but at present stops at Marshúk after passing through the rock of that name. The dimensions of the channels correspond to the greatness of the city which it was to supply. An interesting question presents itself on the subject of this

aqueduct: as I have just said, it stops at Marshúḳ, *i. e.*, at 2700 yards from Ṣúr; but it may be traced by the ruins, which are not yet covered by sand, to the towers marked on the plan by No. 19. These towers cover reservoirs of fresh water, which amply supply the wants of the 1200 inhabitants of the town, and also suffice to water the gardens around.

Volney supposes that the water is carried there by a subterranean channel wrought in the foundation of the aqueduct; I thought so myself for a moment, but a circumstance, which I had not observed at my first visit to Marshúḳ, appeared to destroy this opinion. In modern times a sugar-mill has been constructed on that site, and precisely at the spot where the aqueduct is interrupted a cave has been dug to receive the mechanism of the mill; this cave would have met the subterranean channel if it had been made in the foundations of the aqueduct, and if so, the water would no longer have reached Ṣúr. I have in my possession two bottles of water, one taken at Rás-el-'Aïn, and the other at the reservoir at Ṣúr, which I will cause to be analyzed; as to the temperature, there was 1° of difference in the two places. At Rás-el-'Aïn, 2 o'clock, P.M., the temperature of the air being 82° Fahr., that of the water 68°. In the reservoir at Ṣúr, temperature of the air the same, of the water 67°.

The temperature of the air being more elevated than that of the water of the reservoirs at Rás-el-'Aïn, it does not appear to me probable that this water is the produce of wells obtained by boring as several travellers have supposed, since a number of facts prove that the temperature of such wells is always higher than that of the surface of the earth.

Both Mr. Moore, the British consul at Beïrút, who accompanied me to Tyre, and myself, bought from the Arabs several intaglios of pretty good workmanship; my travelling companion possesses a Hercules beautifully executed, but the head of which is unfortunately a little damaged, and also a scarabæus of white agate in perfect preservation, bearing an inscription in Phœnician characters terminated by a date. I also purchased besides some coins, a Minerva Medica of fine workmanship and in perfect preservation, and a head, which from the features and the Phrygian bonnet, I fancy to be that of Æsop, and lastly, a Cupid, whose particular attributes I cannot make out.

A felláh of Ṣúr some time ago found a marble torso of a young man; although the workmanship is not bad, it did not strike me as sufficiently good to merit a place in an European collection.

I have much pleasure in acquainting you with a discovery of a monument which affords a fresh confirmation of the accuracy of Herodotus respecting the expedition of Sesostris. Reading a short time ago this learned historian, I came to the following passage, after several paragraphs upon the same subject:—" La

plupart des colonnes (*stèlè?*) que Sésostris fit élever dans les pays qu'il subjugua ne subsistent plus aujourd'hui. J'en ai pourtant vu dans la Palestine de Syrie, et j'y ai remarqué les parties naturelles de la femme, et les inscriptions dont j'ai parlé plus haut."

This obscene representation, which indicates the cowardice shown by the people in the defence of their territory, brought to my recollection that I had heard of the existence of similar representations in this neighbourhood, but which were attributed to certain rites of the Ansáríes. I thought I remembered that it was on the rocks of the Necropolis of 'Adelún they had been seen, and the following day at 3 o'clock in the morning, I rode thither with the hope of finding both these emblems and some monuments of Egyptian workmanship, which might attest their origin: at 4 o'clock in the afternoon I arrived at the monument described by Herodotus.

I visited with great care the whole of the Necropolis without finding any other sculptures than that alluded to. I may remark that the frame of this monument differs entirely from those of Nahr-el-Kelb, and does not bear, as they do, the emblem of a winged globe. Although the inscription on the above monument is very indistinct, I can affirm that it is written hieroglyphics. The rock of 'Adelún is hard and of a grey colour; in a word, similar to that of the defile at Nahr-el-Kelb; and if this monument is more defaced than those which are better preserved in the latter place, it is to be attributed to its being less sheltered, and more exposed to the westerly winds which prevail on this coast. The Necropolis of 'Adelún is situated 3 hours to the N. of Tyre, and the river Kásimíyeh (Leontes) flows at about an equal distance between these two places. Between the rock where the subterranean excavations exist and the sea, there is a plain of about 850 yards wide, covered with ruins which attest the existence of a city. Several names being rudely engraved on the rock in Greek characters, as well as Greek and Latin crosses on some of the tombs, I am led to suppose that it was inhabited by Christians. The Egyptian stèlè is situated 50 paces to the N. of a cavern which the traveller cannot fail to perceive in following the road from Sidon to Tyre. The Necropolis of 'Adelún contains more than 2000 excavations; all those which I entered were made to receive three bodies; the furthest compartment, being probably reserved for the head of the family, is invariably larger than those at the sides.

I sought in vain on the rocks and in the tombs for the allegorical images seen by Herodotus; but I have just learnt that those of which I had been informed, exist at a small distance (towards the S.) beyond the place where I discovered the Egyptian stèlè, and that they cover the sides of a small temple cut in the rock

and in which is still seen an altar, and an inscription in Greek characters, probably the dedication of the temple to Venus. I shall not fail to visit with care this monument. Would it not be curious to find there some vestiges of Egyptian sculpture which would give to the allegory of which I have before spoken an origin which was probably unknown to those who wrote the Greek inscription?

To what city did the Necropolis of 'Adelún belong? It could not be Sarepta, whose name is preserved in that of Ṣarfand, a little Arab village, the position of which is well known. The city of Leontopolis must have been on the banks of the Leontes, where ruins are still seen; the Necropolis then must have depended on Ornithopolis, which Strabo places between Sidon and the Leontes.

References to the Plan of Ṣúr.

1. Bogáz, or entrance of the port, now obstructed by columns.
2. Forts.
3. Wall which enclosed the port.
4. Second wall or breakwater.
5. Space, thirty yards wide, in which are many columns under water.
6. Fort, with a pharos (built by the Crusaders ?)
7. Rocks on part of which the wall is built.
8. Column of beautiful rose-coloured granite.
9. Rocks and many grey granite columns. Line of a wall of circumvallation, amongst the ruins of which there is a considerable quantity of broken pottery; it extends from No. 7 round the coast to 16.
10. After excavating at this spot to the depth of nearly four yards, through ruins, I reached a pavement of slabs so large that I could not succeed in moving them.
11. Small hills, rising about four yards above the general level of the ground, which is about two yards above the sea.
12. Appears to be the highest point of the peninsula.
13. Hypogeum (square chamber, five yards by four).
14. Sarcophagus.
15. Granite column, still standing.
16. The stones which formed the base of the wall have marks which show that they were connected by iron cramps.
17. Two masses of masonry covered with sand. The space between them probably formed a landing-place.
18. Numerous columns on the beach and in the sea, possibly the site of the Temple of Hercules.
19. Square towers, above tanks of fresh water used by the inhabitants.
20. Port or building-dock, with 6 feet depth of water.
21. Walls nine yards wide, rising a little above the surface of the water, and usually taken for rocks. The external part of the walls is of fine broad stones, the interior of rubble and broken pottery.
22. Gate of the town.
23. A great number of columns under water.
24. Islets on the level of the sea.
25. An embankment or bank under water, extending 2 miles in a S.S.W. direction.
26. Columns of grey granite, marking the site of the Cathedral built by St. Eusebius.
27. Rocky bank which extends west one mile, with fourteen fathoms water at its outer extremity.
28. Angle of the ancient wall of circumvallation, probably the limit of the island?
29. In digging between these two lines, salt water is found at 6 feet depth.
30. Sandy bottom, with from 6 to 8 fathoms water, throughout the space comprised between the bank and the beach.

XII.—*Extracts from a Journal of Travels in Palestine &c., in 1838; undertaken for the Illustration of Biblical Geography.* By the Rev. E. Robinson and the Rev. E. Smith. Drawn up by the Rev. Edward Robinson, D.D., Professor of Theology in New York.

I. From 'Akabah to Jerusalem, through the Western Desert.

It had been our intention to go directly from 'Akabah to Wádí Músa along the great valley El 'Arabah; but circumstances induced us to change our plan; and we determined to keep our good Towárá guides, and take the road across the Great Western Desert in the direction of Gaza and Hebron,—a route as yet untrodden by modern travellers. Besides our five Towárá Arabs under the direction of Tuweileb, who had travelled with Rüppell, Laborde, and Lord Lindsay, we took two Arabs of the 'Amrán, a tribe living around 'Akabah and to the S.E. of that place, as the Towárá were not acquainted with the route we proposed to follow. We left 'Akabah late in the afternoon of April 5th, 1838, and, recrossing the plain of Wádí 'Arabah, began to ascend the western mountains by the great Hajj route. We soon encamped for the night; and from this point we had seven long days' journey with camels to Hebron. The ascent soon becomes steep and difficult. The way is almost literally strewed with the bones of camels, and skirted with the graves of pilgrims; all testifying to the difficulty of the pass. On reaching the summit, we soon came out upon the great plateau of the Desert, probably from 1200 to 1500 feet above the sea, and found ourselves higher than the mountain-peaks which we had seen from below, and through which we had just ascended. Not far from the top of the pass, we left the Hajj route; and, turning off in a direction about N.N.W., we launched forth again into "the great and terrible wilderness."

For the first two days the general character of this desert was similar to that between Cairo and Suez,—a vast unbounded plain, a hard gravelly soil, irregular ridges of limestone hills in various directions, the mirage, and especially the Wádís or watercourses. Our Arabs gave to this part of the Desert the name Et-Tíh, the Desert of Wandering. The Wádís are here frequent: at first they all ran N.W. into the main watercourse of this part of the Desert, Wádí Jeráfeh; which, having its head far to the south, runs in a N.E. course to join the valley El 'Arabah nearly opposite to Mount Hor. We crossed Wádí Jeráfeh about the middle of the second day, and were struck with the traces of the large volume of water which apparently flows through it in the winter season. On the morning of the third day we reached the watershed of the Desert; after which all the Wádís run in a westerly direction into the great watercourse which drains the more

western part of the Desert, and flows down to the sea near El 'Aräish.

Almost from the time we entered upon this vast plain, we had before us, as a landmark, a high conical mountain, apparently isolated, along the western base of which we were to pass. It bears the name 'Aráif en-Nákah; and a lower ridge extends from it eastward. For nearly three days this mountain of the Desert was before us. As we approached it on the third day, the country became undulating and uneven, and the hills more frequent. I estimated the height of Jebel 'Aráif above the plain at about 500 feet; it is composed wholly of limestone, covered with pebbles of flint, and has no traces of volcanic action. It forms the south-western corner or bulwark of the mountainous region which extends hence to the northward; and from it a ridge stretches east, terminating in a bluff called Makrah, near El 'Arabah and opposite Mount Hor, as we saw, on a subsequent journey, from the pass of Nemellah.

The general elevation of the great plateau continues nearly the same, except where traversed by the Wádís; and the gradual ascent to the water-shed is not perceptible, and can only be discovered by the course of the streams in the valleys.

To the S.S.W. of Jebel 'Aráif is a mountain called Ikhrim, lying between our route and Wádí 'Aräish, and farther to the north we saw the mountains Yelek and El-Helál. After passing Jebel 'Aráif, our course turned more towards the N.N.E., and the character of the Desert was changed. On our right was now a mountainous district, composed of irregular limestone ridges, running in various directions, and occupying the whole region quite to Wádí 'Arabah; as we had afterwards an opportunity of observing. This mountainous district is penetrated by none of the roads which lead from the vicinity of the Red Sea to Gaza or Jerusalem; but these roads all fall into the one we were travelling before reaching Jebal 'Aráif, or not far from that mountain. All these circumstances go to show that our route could be no other than the ancient Roman road from Aïlah to Hebron and Jerusalem; which also, like the present road, could not well have been anything more than a caravan route for beasts of burden.

The road passes along the western side of this mountainous district, crossing many broad Wádís which flow down from it westward, with elevated ridges of table-land between them. We made frequent and minute inquiry after the names of places or stations which are known to have existed anciently upon this Roman road. Of the more southern ones, Rosa and Gypsaria, we could find no trace. Early on the fourth day we crossed a broad Wádí called El-Lisán, marking perhaps the site of ancient Lyssa; but we could discover no trace of ruins. In the forenoon

of the fifth day we diverged a little to the left, to visit ruins which had been described to us under the names Anjeh and 'Abdeh, and which are doubtless the remains of ancient Eboda. They consist of the walls of a large Greek church, and an extensive fortress, both situated upon a long hill or ridge overlooking a wide plain. Connected with the fortress are cisterns and deep wells walled up with uncommonly good masonry. On the south side of the hill and below are the ruins of houses, surrounded by traces of extensive ancient cultivation.

We were now crossing a more sandy portion of the Desert; and in the afternoon of the same day we had our first specimen of the simoom or southern wind of the Desert. It came over us with violence like the glow of an oven, filling the air with fine particles of dust and sand, so as to obscure the sun and render it difficult to see objects only a few rods distant. We encamped in Wádí Ruheïbeh, where we had never heard of ruins; but, on ascending the hill on our left, we discovered the remains of a city not much less than 2 miles in circuit. The houses had been mostly built of hewn stone; there were several public buildings and many cisterns; but the whole is now thrown together in unutterable confusion, as if the city had been suddenly overthrown by some tremendous earthquake. What ancient city this can have been, I have not yet been able to learn. The Arabic name suggests the Rehoboth of Scripture, the name of one of Isaac's wells (Gen. xxvi. 22), but the other circumstances do not correspond.

We now approached a more fertile region. Towards noon of the sixth day we reached Khulásah, the site of ancient Elusa. It was a city of at least 2 miles in circuit. The foundations of buildings are everywhere to be traced; and several large unshapen piles of stones seem to mark the sites of public edifices. Fragments of columns are occasionally seen, but no cisterns. A public well, still in use, seems to have supplied the city.

After crossing another elevated plateau, the character of the surface was again changed. We came upon an open undulating country: all around were swelling hills, covered in ordinary seasons with grass and rich pasturage; but now arid and parched with drought. We now came to Wádí Seba'; and on the N. side of its watercourse we had the gratification of discovering (April 12th) the site of ancient Beersheba, the celebrated border-city of Palestine, still bearing in Arabic the name of Bír Seba'. Near the watercourse are two circular wells of fine water, more than 40 feet deep. They are surrounded with drinking-troughs of stone for the use of camels and flocks; such as were doubtless used of old for the flocks and herds which then fed on the adjacent hills. Ascending the higher ground N. of the wells, we found these low hills strewed with the ruins of former habitations,

the foundations of which are distinctly to be traced. These ruins extend over a space half a mile long by a quarter of a mile broad. Here then is the spot where Abraham and Isaac and Jaceb often lived! Here Samuel made his sons judges; and from hence Elijah wandered out into the southern Desert, and sat down under the Rethem, or shrub of broom, just as our Arabs sat down under it every day and every night! Over these swelling hills the flocks of the patriarchs roved by thousands;—we now found only a few camels, asses, and goats.

From Bír Seba' to Hebron we travelled 12½ hours, here equivalent to about 30 miles. The general course was N.E. by E. After 1½ hour we came out upon a wide open plain, covered with grass, but now parched with drought. Fields of wheat and barley were seen all around; and before us were hills, the beginning of the mountains of Judah. At Dhoheríyeh, the first Syrian village, the hills around were covered with mingled flocks of sheep and goats, and herds of neat cattle, horses, asses, and camels, in the true patriarchal style of ancient days. At this place our good Towárá left us: we took other camels and proceeded to Hebron. Here the pool over which David hung up the assassins of Ishbosheth still remains, and fixes the site of the ancient city. The cave of Macphelah cannot well have been within the city; and therefore the present mosque cannot cover its site. We could not but notice the fertility of the neighbouring valleys, full of corn-fields and vineyards yielding the largest and finest clusters of all Palestine; and likewise the rich pasturage of the hills, over which were scattered numerous flocks and herds. Yet to a careless observer the country can only appear steril and forbidding; for the limestone rocks everywhere come out upon the surface, and are strewn over it to such a degree, that a more stony or rocky region is very rarely to be seen.

We took the direct road to Jerusalem. It is laid with stones in many places, and is doutless the ancient road, which patriarchs and kings of old have often trod; but it is only a path for beasts; no wheels have ever passed there. The distance to Jerusalem is about 21 miles, on a course between N.N.E. and N.E. by N. We hurried onward, and reached the Holy City at sunset, April 14th, just before the closing of the gates on the evening before Easter Sunday.

II. Jerusalem. Our journey *to* Palestine was now completed; and our researches and travels *in* Palestine were to begin. In respect to these we adopted for our future guidance the two following principles, viz., 1. To direct our researches chiefly to those parts of the country which former travellers had never visited; and, 2. To obtain information, as far as possible, not from the legends of monks and other foreigners, but directly from the

native Arabs of the land. We remained at first more than three weeks in Jerusalem; and afterwards made that city the central point from which to set off on excursions to different parts of the country. In the mean time we diligently explored every part of the city, and even here saw or heard of several things which to us at least were new.

On entering Jerusalem I was prepared, from the descriptions of many travellers, to find the houses miserable, the streets filthy, and the population squalid; but in all these respects I was agreeably disappointed. The houses are better built, and the streets cleaner, than those of Alexandria, Smyrna, or Constantinople. The hills and valleys which marked the different quarters of the ancient city are still distinctly visible. The valley of the Tyropœum may be traced from its head near the Yaffá gate to its foot at the pool of Siloam. The hills of Zion, Akra, Bezetha, and Moriah, are yet distinct and marked. The latter, on which stood the ancient Temple, is now occupied by the mosque of 'Omar and the extensive court or area around it.

One of the earliest objects of our attention was naturally this area, in reference to its antiquity and connexion with the ancient Temple. It is an elevated plateau or terrace, nearly in the form of a parallelogram, supported by and within massive walls built up from the valleys or lower ground on all sides. The southern wall is about 60 feet high. The upper part of these external walls is obviously of modern origin; but it is not less easy to perceive that the lower portions, for the most part, are of an earlier date. These are composed generally of very large stones, many of them 20 feet or more in length by 5 or 6 feet thick, hewn in a peculiar manner. At the first view of these walls, I felt persuaded that these lower portions had belonged to the ancient Temple, and were to be referred back at least to the time of Herod, if not to the days of Nehemiah or Solomon. This conviction was afterwards strengthened by our discovering, near the S.W. corner in the western wall, the remains, or rather the foot, of an immense arch, springing out from the wall in the direction towards Mount Zion, across the valley of the Tyropœum. The traces of this arch are too distinct and definite to be mistaken; and it can only have belonged to the bridge which, according to Josephus, led from this part of the Temple-area to the Xystus on Zion; thus proving incontestably the antiquity of that portion of the wall from which it springs.

We then examined the remarkable tower in the citadel near the Yaffá gate, which, even to the unpractised eye, bears strong marks of antiquity. Some former travellers have already regarded this as the Hippicus of Herod; and we found every reason to assent to this conclusion. So far as we could discover, the lower

part of the tower is wholly solid, as described by Josephus; at least there is no known or visible entrance to it, either from above or below.

The present walls of the modern city were built about 300 years ago, as appears from numerous Arabic inscriptions. Remains of the former wall, which probably existed in the time of the crusades, are still visible on the outside, N.W. of the Yaffa gate; also on the N. side of the city, and in the interior of the N.W. corner. Of the *ancient* wall around Mount Zion, traces may yet be seen for some distance in the scarped rocks below the S.W. brow of Zion. On the high ground N. of the N.W. corner of the city we discovered evident traces of what must have been the *third* or exterior wall described by Josephus in this quarter, erected after the time of Christ. Here must have stood the tower Psephinos; and from this point we were able to trace the foundation of the same ancient wall for a considerable distance further in a N.E. direction.

Of the *second* wall of Josephus, which at the time of the Crucifixion was the exterior wall of the city on this side, we could find no remaining traces, unless it be two square ancient towers which we discovered connected with the wall inside of the Damascus gate, one on each side of the gate. These towers are built of large stones precisely like those mentioned above as belonging to the ancient Temple walls. They have been much injured in building the modern wall of the city, but are evidently ancient, and apparently older than Hippicus; they were, most probably, the guard-houses of an ancient gate upon this spot; and this could well only have belonged to the said second wall. If this hypothesis be correct, it will go far to decide the question as to the site of the church of the Holy Sepulchre, which must then have fallen within this wall, and so within the ancient city. Indeed, the church stands upon the very ridge of the hill Akra, which, according to Josephus, and to every probability, must have formed part of the lower city, and been enclosed within the second wall.

Another object of our attention was the supply of water in and around the city. At the present day Jerusalem is supplied almost wholly by rain-water, preserved in cisterns cut in the rock on which the houses stand. Almost every house has one or more cisterns; that in which we resided had no less than four very large ones. The ancient city was probably supplied in the same manner. Indeed, with a little attention, there can never be any want of water within the walls. The aqueduct which comes from Solomon's pools beyond Bethlehem brings water only to the mosque of 'Omar. Outside of the city, besides the ancient reservoirs, there are wells in various places, some with water and some

without. The brook Kidron, in the valley of Jehosaphat, flows only when the rain-water descends into it from the adjacent hills. Fountains of running water exist only in this valley; and of these there are three, viz.:—1. the fountain of the Virgin, or of Siloam, just south of the site of the Temple; 2. the pool of Siloam, just within the entrance of the Tyropœum; 3. the well of Nehemiah, or of Job, opposite the entrance of the valley of Hinnom. This last is a deep well of living water, which in the rainy season overflows: it is, beyond doubt, the En Rogel of Scripture. The pool of Siloam is wholly artificial, and receives its waters from the fountain of the Virgin, through a subterraneous channel cut through the solid rock. We crawled through this channel and measured it. The fountain of the Virgin is also evidently an artificial excavation in the rock; but whence the water is derived is a mystery. It has a sweetish, slightly brackish taste; and flows irregularly, or only at irregular intervals. We were witnesses of this irregular flow; and were told by the women who came for water that sometimes, during summer, it ceases to flow for several weeks; when, on a sudden, the water comes gushing out again in abundance.

Ancient writers have spoken of a fountain of living water as existing under the Temple; though their assertions have, in general, obtained little credit. Soon after our arrival in Jerusalem, we were told of a similar fountain under the mosque of 'Omar, the waters of which were used to supply a bath in the vicinity of the mosque. We went to the bath, and found two men drawing water from a deep well. They told us that the water flows into the well from a passage cut in the rock, and leading under the mosque, where is a chamber and a living fountain. In summer, when the water is so low as not to flow out into the well, they go down and bring it out by hand. The taste of the water is precisely like that of the fountain of the Virgin in the valley below. We made all our preparations to descend into the well and examine the fountain, but were hindered at the time, and were unable afterwards to resume the investigation. Is, perhaps, the water of this fountain brought down by a subterraneous channel from some higher point? Is there a connexion between this fountain under the mosque and that in the valley below; and is the irregular flow of the latter in some way dependent on this circumstance? These questions may, not improbably, at some future time, be answered in the affirmative.

When we arrived at Jerusalem war was raging in the north between the Druses and the forces of the Páshá; and, as if we were to have a specimen of all the evils of the Oriental world, in a few days after our arrival the plague broke out; at first doubtfully, then decidedly, though mildly. Other travellers left the

city immediately; and some who were on their way thither turned back. We continued our investigations without interruption; and a kind Providence preserved us from the danger.

III. From Jerusalem to Gaza, Hebron, and Wádí Músá.

On returning to Jerusalem, from an excursion of eight days to Engeddi and the Dead Sea, we found the plague slowly but constantly increasing; and it was rumoured that the city was soon to be shut up. We therefore remained but a single day, in order to make preparations for our longer journey to Wádí Músá. We set off, May 17th, on horses and mules; and, on May 19th, the city was shut up, and none suffered to go out, without first performing a quarantine of seven days. Our excursion occupied in all 23 days.

We made at first a slight detour, in order to pass by Beït Jala, a Christian village, half an hour N.W. of Bethlehem; and then continued S.W. across the mountains to the direct ancient road from Jerusalem to Eleutheropolis and Gaza, through a region as yet unvisited by modern travellers. At a distance on our right was the deep valley of Turpentine (so called by monks and travellers), or, as the Arabs name it in this part, Wádí Surár, which runs in a S.W. direction, until it opens out into the great plain between the mountains and the Mediterranean. On our left was another similar valley, Wádí Sunnet. The region is full of ruined sites and ruined villages, some deserted and some partially inhabited; among which are still found several ancient names. On our right, beyond Wádí Surár, we could see the hill and ruined village Sohá, which it has pleased the monks to assume as the ancient Modin, the burial-place of the Maccabees, against the express testimony of Eusebius and Jerome. We came at night to Beït Netíf, a large village on a high part of the ridge between the two valleys above mentioned.

The next day was devoted to a visit to Beït Jibrín, the ancient Betogabris of Greek and Roman writers, of which and its fortress we had heard much from the Arabs; and to a search for the site of ancient Eleutheropolis. From the elevated spot where we lodged, the sheïkh of the village pointed out to us several places still bearing, in Arabic, names corresponding to their ancient Hebrew appellations, and celebrated in Scripture as the scenes of Samson's exploits and history: such were Zorah, Timnath, Sokho, and others. Four places were also pointed out, respecting which Eusebius and Jerome have specified their distances from Eleutheropolis, viz., Zorah and Bethshemesh, towards Nicopolis; and Jarmah and Sokho, on the way to Jerusalem. Following out the specified distances along the ancient road, we came directly upon Beït Jibrín, which lies among hills between the mountains and

the plain. Here are the remains of a large Roman fortress of immense strength, which was built up again in the time of the crusades: around it are the traces of an extensive city.

We had received the impression that we must look for Eleutheropolis further west upon the plain; and accordingly turned our course that way to Ṣafíyeh, a conspicuous village, lying on an isolated hill. Here, however, we could find no trace of any ancient site. We then proceeded to Gaza; whence, after two days, we returned by a different route, searching diligently for the sites of ancient Lachish, Gath, and other cities, but finding none except Eglon, on a mound strewed with stones, still called 'Ajlán. Again arrived at Beït Jibrín, we visited several very singular artificial caverns in the vicinity. Eusebius and Jerome mention also Jedna and Nazib as being distant from Eleutheropolis, one 6 and the other 7 miles, on the way to Hebron. These names still exist; and, taking the Hebron route, we found Jedna to be just 6 miles from Beït Jibrín. Nazib lies yet a little further on another parallel road. This circumstance seems to decide the identity of Beït Jibrín with Eleutheropolis. The former was the ancient name; the latter was imposed by the Romans, and has been since forgotten, as in so many other instances. It is also remarkable that those ancient writers who speak of Eleutheropolis do not mention Betogabris; while those who speak of the latter are silent as to the former. Rejoicing in this result, we pursued our way to Hebron; and, after a steep and toilsome ascent on a ridge between two deep valleys, we rested for a time at Taffúh, the Beth Tappuah of Judah; and arrived at Hebron in about 6 hours from Beït Jibrín. Here, dismissing our muleteers, we engaged camels for Wádí Músá from the sheïkh of the Jehálín, a Bedawí tribe inhabiting the territory S.E. of Hebron.

We had long before formed the plan to proceed to Wádí Músá by way of the south end of the Dead Sea, and so southwards along Wádí 'Arabah, in the hope of being able to solve the pending question, whether the Jordan could ever have flowed through this valley to the Gulf of 'Akabah. Here, too, we had hoped again to have been the first; but were anticipated by the Count de Bertou, who preceded us by three or four weeks, and whom we had seen at Jerusalem after his return. After being detained two days at Hebron, we set off, May 24th; and, passing in sight of ancient Ziph on the left, and Yutta (ancient Jutta) on the right, and near the ruins of Carmel and Maon, we continued across an undulating desert in a S.E. direction, and came, towards the close of the second day's journey, to the brow of the steep descent leading down to the Dead Sea. This descent is in all not less than 1500 feet; but here, and far to the south, it is divided into two parts or offsets of nearly equal height: between these

lies a terrace or plain nearly three hours broad, the surface of which is covered with low ridges and conical hills of soft chalky limestone, verging into marl. At the foot of the second descent is a small deserted Turkish fort, in the narrow Wádí Zuweïreh (not Zoar), which leads out to the sea in about half an hour. We reached the shore not far from the northern end of Usdúm, a low, long mountain ridge, running here from N.N.W. to S.S.E., and giving the same direction to the shore of the sea. This ridge, Usdúm, is, in general, not far from 150 feet high, and continues to run in this direction for two hours to the southern extremity of the sea, where it trends to the S.S.W. for an hour more, and then terminates. The striking peculiarity of this mountain is, that the whole body of it is *a mass of solid rock-salt;* covered over, indeed, with layers of soft limestone and marl, or the like, through which the salt often breaks out, and appears on the sides in precipices, 40 to 50 feet high, and several hundred feet long. Often also it is broken off in large and small pieces, which are strewed like stones along the shore, or fallen down as débris.

The south end of the sea is very shallow, and the shore continues quite flat for some distance further south; so that there are traces of its being overflowed by the sea for two or three miles south of the water-line, as we saw it. The western side of this southern valley, or Ghor, is wholly naked of vegetation; but on the eastern side, where streams come down from the eastern mountains, there is a luxuriant vegetation and some tillage. We continued on the western side, along the base of Usdúm, crossing several purling rills of transparent water, flowing from the mountain towards the sea, but salt as the saltest brine. Before us, as we advanced southwards, appeared a line of cliffs, 50 to 150 feet high, stretching across the whole broad valley, and apparently barring all further progress. These cliffs are mentioned by Irby and Mangles, who supposed them to be sand-hills. We approached their western end in 2½ hours from the south end of the sea. They proved to be of marl, and run off from this point in a general course S.S.E. across the valley. All along their base are fountains of brackish water oozing out, and forming a tract of marshy land towards the north. Our route now lay along the base of these cliffs; and, after resting for a time at a fine gushing fountain, we came, in two hours, to the mouth of Wádí Jíb, a deep valley coming down from the south through the cliffs, and showing the latter to be only an offset between the lower plain which we had just crossed, and the higher level of the same great valley further south. The name El Ghór is applied to the valley between the Dead Sea and this offset; further south the whole of the broad valley is called El 'Arabah, quite to 'Akabah. These apparent cliffs are not improbably the 'Akrabbim of Scripture. The Wádí Jíb begins far to the south of Mount Hor, beyond

Wádí Gharandel, and flows down in a winding course through the midst of El 'Arabah, draining off all its waters northward to the Dead Sea. Where we entered Wádí Jíb, at its northern side, it is half a mile broad, with precipitous banks of chalky earth or marl, 100 to 150 feet high; and exhibiting traces of an immense volume of water in the rainy season, flowing northwards. It may be recollected that the waters of Wádí Jeráfeh, in the western desert, which drains the S.E. part of that desert, far to the southward of 'Akabah, also flow northwards into El 'Arabah, and so, of course, through Wádí Jíb. Hence, instead of the Jordan flowing southwards to the Gulf of 'Akabah, we find the waters of the desert further south than Akabah flowing northwards into the Dead Sea. The nature of the country shows, without measurement, that the surface of the Dead Sea must be lower than that of the Red Sea or the Mediterranean.

We continued our course up the Wádí Jíb southwards for several hours, its banks becoming gradually lower, and at length permitting us to emerge from it. We were now not far from the eastern mountains, nearly opposite the broad Wádí Ghuweïr, while before us was Mount Hor, rising like a cone irregularly truncated. We turned into these mountains at some distance north of Mount Hor, in order to approach Wádí Músá from the east, through its celebrated ancient entrance. A long and steep ascent—the pass of Nemellah—brought us out upon the plateaus of the porphyry formation; above which are still the hills of sandstone among which Petra was situated. The entrance to this ancient city, through the long chasm or cleft in the sandstone rock, is truly magnificent; and not less splendid and surprisingly beautiful is the view of the Khazínah, or temple hewn in the opposite rock, as the traveller emerges from the western extremity of the passage. Then follow long ranges of tombs hewn in the rocky sides of the valley, with ornamental façades, in a style of striking though florid architecture. What we sought in Wádí Músá was more the general impression of the whole; since the details have been correctly given by the pencil of Laborde. We examined particularly whether any of these excavations were perhaps intended as dwellings for the living: but could see no marks of such design—nothing but habitations of the dead, or temples for the gods. There was, indeed, no need of their being thus used; for the numerous foundations of dwellings show that a large city of houses built of stone once stood in the valley.

We had nearly completed our observations, and were preparing soon to set off on our return by way of Mount Hor, when the old sheïkh of Wádí Músá, Abú Zeïtún, who caused so much difficulty to Mr. Bankes and his companions in 1817, came down upon us with thirty armed men, demanding a tribute of a thousand piastres for the privilege of visiting his territory. We declined

payment of course; but, after long and repeated altercation, it came to this result, that, unless we paid this full sum, he would not suffer us to visit Mount Hor. We attempted, nevertheless, to set off in this direction, our own sheikh leading the forward camel; but the hostile party closed around, and swords were drawn and brandished; which, however, among these Arabs, means nothing more than to make a flourish. As it was in vain for us to use force against so large a party, we decided to set off on our return by the way we came. This took the old man by surprise, and thwarted his plans. Messengers soon followed us, saying we might return for the half; and, at last, for nothing. We replied, that he had driven us from Wádí Músá, and we should not return, but should report his conduct at Cairo. The old man then came himself, to get our good-will, as he said, which was worth more to him than money. We thought it better to keep on our way; and suffered no further interruption. It was probably the fear of the Páshá of Egypt alone that withheld these miscreants from plundering us outright; and we afterwards received compliments from the Arabs in and around Hebron for the boldness and address with which we had extricated ourselves from the old sheïkh's power.

Descending the pass of Nemellah, we struck across El-'Arabah in a W.N.W. direction, travelling the greater part of the night. In the morning we reached Wádí Jíb, here quite on the western side of El-'Arabah, and stopped for a time at the fountain El Weibi. Other fountains occur at intervals along the valley at the foot of the western hills, both north and south of El Weïbí. From here a path strikes up the western mountain in the direction of Hebron, which is used by the southern Arabs. Our guides took a more northern road, leading up a very steep pass called Sufáh, over a broad surface of shelving rock extending nearly from the bottom to the top, an elevation of 1000 or 1200 feet. This is probably the hill Zephath, afterwards Hormah, where the Israelites attempted to enter Palestine, but were driven back, and were also attacked by the king of Arad; Num. xiv. 40, seq., xxi. 1, seq., Judges i. 17. Some miles N.N.W. of this pass is a conical hill still bearing the name of Tel Arad, probably the site of the ancient town. All these circumstances lead me to place the site of Kadesh in the great valley below, near the fountain El Weïbí or one of the neighbouring springs. Here it would be near the border of Edom, opposite to a broad passage leading up through the eastern mountains, and in full sight of Mount Hor. That the Israelites must have approached Palestine through the Wádí 'Arabah, is a necessary conclusion from the mountainous character of the district on the west of this valley, through which no road has ever passed. But no trace of the name Kadesh is to be found, neither in the valley below nor on the table land above.

Our further way to Hebron led us by the sites of 'Ararah, the Aroer of Judah; and Melh, where is a fine well and the traces of a town, not improbably the ancient Moladah or Malatha. Nearer to Hebron we passed Semú'ah, perhaps the Hebrew Sema; and Yuttah, the ancient Sutta, the probable birthplace of John the Baptist, and still a town of some importance. At Hebron we remained a day and a half, being obliged to send for horses to Jerusalem.

We left Hebron again on the 6th of June, taking now a S.W. course by the large village Dúrah, the Adora of Josephus; and descending the mountain to El Burj, a ruined castle of which we had heard much, but where we found nothing of antiquity. Hence we bent our course northward among the hills; and passing again through Jedna, rested for a time at Terkumieh, the Tricomias of former ages, leaving Beït Jibrín on our left. We lodged a second time at Beit Neïtíf; and the next morning descending N.N.W., we came to the site of the ancient Bethshemesh in the opening of Wádí Surár into the plain. Here are evident traces of a large city. From this point we turned our course N.W. into the plain, in search of the ancient and long-lost Ekron. After travelling in this direction for four hours, we came to the large village 'Ak[illegible], an Arabic name corresponding to the Hebrew Ekron. The situation corresponds also to the accounts of Eusebius and Jerome. Nothing of antiquity remains; perhaps because the ancient houses, like the modern hovels, were built, not of stone, but of earth.

From Ekron to Ramleh is two hours: here we lodged; and the next day proceeded to Jerusalem by the camel-road, which also is the ancient Jewish and Roman way, over Ludd (Lydda), Gimzo, Lower and Upper Bethhoron (now Beït-U'r), and Jib or Gibeon. The pass between the two villages of Bethhoron is a steep and rugged ascent of some 1500 feet, up the point of a ridge between deep valleys. It is the ancient road which the Roman armies ascended, and has in several places steps cut in the rock. The present shorter and less practicable route between Ramleh and Jerusalem appears not to have been in use in the time of the Romans. Looking down from Upper Bethhoron, a broad valley is seen in the S.W. issuing from the mountains and hills into the plain; while on the ridge that skirts its S.W. side, is seen a village called Yálon, the Arabic form for the Hebrew Ajalon. Here then is probably the spot where Joshua in pursuit of the five kings, having arrived at Upper Bethhoron, looked back toward Gibeon, and down upon the valley before him, and uttered the command: "Sun, stand thou still on Gibeon; and thou, Moon, in the valley of Ajalon!"

We found Jerusalem still shut up on account of the plague

and therefore pitched our tent in the olive-grove north of the city, before the Damascus gate. * * * *

In other excursions from Jerusalem, and on our subsequent journey northward to Beirût, we visited the villages and sites of Anothoth, Gibeah, Micmash, and Bethel, all N.E. and N. of the Holy City, and still bearing in Arabic the names Anátah, Jeba', Mükhmás, and Beit-ín. The extensive ruins of the latter place, Bethel, lie 45 minutes N.E. of Bíreh, just on the right of the Nablús road. Farther north we turned aside to Jifnah, the Gophna of Josephus; and also to Seilûm, the site of ancient Shiloh, which Josephus also writes Silun. (Σιλοῦν.) Along the western shore of the Lake of Tiberias, we made minute and persevering inquiries after the ancient names Capernaum, Bethsaida, and Chorazin; but no trace of them remains among the Arab population. If former travellers have heard these names, it must have been from the monks of Nazareth or their dependents.

On the way from Safet to Tyre, nearly two hours N.W. of Safet, we passed near the crater of an extinct volcano; which was probably the central-point of the great earthquake of Jan. 1st, 1837, by which Safet and the adjacent villages were destroyed.

Extract from a Letter of Professor Berghaus.

Potsdam, April 30, 1839.

Sir,—In accordance with former communications from Professor E. Robinson, of New York, he will transmit to you this day one of the maps, which are the fruits of the travels of himself and his companion, the Rev. E. Smith, in Arabia Petræa, and the Holy Land. I cannot permit the opportunity to pass by without accompanying this sketch with a few words.

In the course of my life I have had in my hands many documents in reference to geographical, and especially cartographical objects, and from them have acquired the conviction that, among all oriental travellers since the time of Niebuhr, the prize is due to the late lamented Burckhardt, so far as it respects minute attention, even to things apparently indifferent, and also accuracy in the measurement of bearings and angles, and in the specification of time for the determination of distances. This conviction I have expressed publicly and unreservedly, perhaps, in other words, in the Memoirs accompanying my maps of Asia.

This view, however, I must now essentially modify, after having carefully examined the Journals of Messrs. Robinson and Smith during their travels in the peninsula of Mount Sinai, through the great desert Et-Tih, and in Palestine. The observations of these two travellers are so full and comprehensive, their notes

upon the form and the features of the country so exact and definite, that the geographer is in a situation, on the basis of these specifications, to construct a special map of the territory, which may perhaps leave little more to be desired.

In support of these views, I may refer to the accompanying sketch-map of the route of the travellers from 'Akabah through the desert Et-Tih to Hebron, which I have constructed, and which we, Professor Robinson and myself, would commend to the favourable notice of the Royal Geographical Society.

Professor Robinson has placed his journals at my disposal, and, on my recommendation, has prepared from them an abstract in a tabular form, particularly adapted to serve as a foundation for the construction of the route-maps.

You will be able to appreciate the impatience with which I entered upon the construction of these maps, if you will have the goodness to call to mind that I published a few years ago a map of Syria, which was so fortunate as to meet the approbation of your Society. [*Journal*, vol. vii. p. 183.] My attention was more especially drawn to the tour from 'Akabah to Hebron, because the travellers have here passed through a real *terra incognita*, which is now for the first time represented on a map. The original sketch of this route is three times larger than the copy herewith forwarded to you. I would also mention that several points, the position of which was determined by Messrs. Robinson and Smith, are not inserted, because they fall without the margin of the copy. These points are Jebel Ikhrim, Jebel Yelek, and Jebel el-Helál, all lying westward of the route, and adapted to determine the course of the Wádí el-'Aráish, and its distance from the line of travel.

In my map of Syria I have assumed Hebron to be in long. 35° 12′ 25″ E. from Greenwich, according to the Azimuth of Jerusalem, supplied by Seetzen's very rough map. (*Syrian Memoir*, p. 34.) But I find this Azimuth to be erroneous, since the itinerary of Messrs. Robinson and Smith gives the long. of Hebron at 34° 57′ 13″ E., a difference of more than a quarter of a degree. Yet I would remark, that even this position can only be regarded as a *first approximation* to the true longitude of Hebron, inasmuch as the subsequent routes of the travellers afford the means of corroborating the determination from both Jerusalem and Ramleh, and, above all, from Gaza, which lies nearly on the same parallel with Hebron, or El-Khulil.

The most inaccurate part of my map of Syria is the topographical delineation of Judea, because no traveller within my reach had then examined this portion of the Holy Land with the same attention which Burckhardt had bestowed on the country E. of the Jordan, and around Mount Lebanon. It is therefore eminently

creditable on the part of Messrs. Robinson and Smith, in respect to Biblical geography, that they have visited and investigated the territory of Judea in all directions—this land of the earliest of all history for the nations of Christian civilization. In this way they have become real discoverers in the field of topography and history.

Their examination extends over the whole country between the shores of the Mediterranean and the Dead Sea, from the parallel of about Nablús to the south end of the Asphaltic Lake, and from these points, on the one hand southwards as far as to Wádí Músa, and on the other northwards as far as to Safed, Saide, and Beïrút.

On the Mount of Olives, Professor Robinson determined the length of a base of 1425·72 yards, by means of which, and the application of their very numerous bearings, I have been able to construct and calculate a net of triangles, extending N. to Taiyíbeh, E. to the Dead Sea, S. (as yet) as far as to the Frank Mountain, and which we may probably be able to carry on as far as to the region of Ramleh and Gaza, and perhaps also to Hebron, Carmel, and 'Aïn Jiddi. I find the distance between the Mount of Olives and the N.W. corner of the Dead Sea to be 29093·5 yards, or 14·34 geographical miles. At 'Aïn Jiddi they measured a second base, in order to determine the breadth of the Dead Sea. This I find to be 15953·1 yards, or 7·86 geographical miles.

I have already constructed a portion of the itineraries in Judea, on a scale three times, and in some parts six times, larger than that of the accompanying sketch map. This was necessary, in order to exhibit in full all the details.

I am of opinion that it would be a great loss for geography, were the materials collected by Messrs. Robinson and Smith not to be used for the construction of a map on a large scale. Their journey, undertaken solely for the interests of Biblical geography, would be deprived of its finest fruits, and the many hardships they must have endured will have been in a measure superfluous, should the results of their measurements and observations be published only in the form of a journal; for this can never produce the lively impression that is felt in looking at a good and accurate map, and this great desideratum I hope shortly to take in hand.

In conclusion, I would remark, as to the accompanying route-map from 'Akabah to Hebron, that the direction of the Wádís between Bírsheba and Hebron may perhaps require some slight correction, when all the itineraries of the travellers shall have been fully constructed.

I have the honour to be, &c.

HEINRICH BERGHAUS,
For. Hon. Mem. R. G. S. of London.

To Captain Washington, R.N., Secretary.

XIII.—*Translation of a Portion of the Account of a Pilgrimage to Jerusalem, Terra Santa, Mount Sinai, and Egypt, begun at Oppenheim on the 23rd of April,* 1483. *Written in Latin by* Bernard de Breitenbach, *Dean of Mentz, one of the Pilgrims; edited in Spanish by* Martin Dampies, *and printed at Saragossa in* 1498. Communicated by Bartholomew Frere, Esq.

[The original work was published in Latin at Mentz, 1486, entitled "Opusculum sanctarum Peregrinationum in Montem Syon, ad venerandum Christi Sepulcrum in Jerusalem, atque in Montem Synai ad divum virginem et martyrem Katharinam;" and again at Spires in 1490, with the title "Peregrinatio Hierosolymitana ad Sepulcrum Domini et Katharinianu ad Montem Sinai, per varias partes Orientis cum iconibus." See Biog. Univ. "Breydenbach." There is likewise a copy in Dutch in the British Museum printed 1486, and bound up with a Latin copy; and there is also a copy in German printed 1488; and, lastly, a Latin copy on vellum in the King's Library at the British Museum, printed 1486.* A folio MS. of this work, written on paper, near the close of the 15th century, is mentioned by Mr. Hunter in his Catalogue of the MSS. in the library of the Hon. Soc. of Lincoln's-Inn, where he states that a French translation was printed at Lyons in 1489.]

Before describing this pilgrimage, it is well to give the form of the contract which we made with the rulers of Jerusalem for our safe conduct to Mount Sinai and thence to the city of Cairo. This contract must be made, before they depart, by all pilgrims who wish to return by the vessel which brought them out; that the captain may wait for them at Alexandria: and this must be done in his presence and in that of the guardian of Mount Sion, because, otherwise, those who remained behind would have difficulty in making a contract, as the Moors would deal arbitrarily and unreasonably with them. Thus we agreed with the Sultan's lieutenant in Jerusalem, whose name was Naydon, and with the chief Calino, who is styled master and knight of the hospital of pilgrims, who was named Sabathytaneo. The contract was made on the 17th day of July.

The first condition was, that they were to give us a safe conduct till we arrived at Mount Sinai and in the monastery of the saint, and from thence to Cairo: in which journey the Calino himself should accompany us, at his own expense, as far as Gazera;

* This copy contains the following prefatory notice by J. West:—"This most rare book of the travels of the religious to the Holy Land, printed on vellum, contains the oldest views engraved that I have ever seen: they seem to have been taken upon the spot. The book was printed at Mentz, 1486, which is seven years before the printing of the Nuremberg Chronicle, which has always been supposed to have been the oldest printed book with charts and maps. I bought this book at the sale of the Harleian printed books. In my collection of ancient engravings there is a historical print with the date 1466."

and should provide for all costs, charges, and duties; otherwise the pilgrims would be thrown into great confusion by the wicked race of the infidels.

It was stipulated in the contract that each of the pilgrims and of their guides, whom they call Mucrelos, should be provided with an ass, and should have provisions for their subsistence till their pilgrimage was completed and they reached Cairo. It was stipulated also that he should take charge of conveying all the provisions and baggage as far as Gazera, excepting the wine which we might choose to carry with us: he was bound to find camels for the conveyance of all the above articles.

It was moreover agreed that from Gazera to Mount Sinai and Cairo he should send with us his deputy, whom they call the under Calino, at our expense. He was bound to provide us a tent well equipped, in order that, if in the midst of that desert we required rest, we might have shelter from the burning heat of the sun; and he was to provide certain skins for carrying water, otherwise we should have many journeys without finding any that we could drink. By the same conditions each of the pilgrims was bound to pay twenty-three ducats, half of it immediately in Jerusalem, the other half when we should have arrived at Gazera, and he should have provided the camels and provisions before-mentioned.

All the above articles of agreement were ratified with the seals of the lieutenant and of the chief Calino; but they are wont to be ill observed, according to the custom which they have of old: and for this provision we paid down two ducats upon the spot.

On the festival of the Magdalen, which is the 22nd of July, our fellow-pilgrims departed to the port of Joppa, because the ships were waiting for them. Only the eighteen under-mentioned remained in Jerusalem in order to proceed to Mount Sinai. We waited for thirty-three days, apprehending the great heat of the sun, and in this interval we frequently visited the accustomed places and stations.

Here are named the knights and pilgrims who desired to visit the virgin martyr St. Catherine: may they be more worthily recorded in the Book of Life!—

El Sr. Don John Count of Solms, Lord of Myntzenberg; the last in point of age, but the first in rank and spirit.

El Sr. Bernard de Breitenbach, Dean of Mayence and chamberlain, the principal author of the present work.

El Sr. Mossen Philip de Bilrem. With these went Erhard Rervich of Utrecht, a very skilful painter, who by his talent painted the scenes here represented well and to the life.

Mossén Maximin of Rapenstein, Lord of Boinech.

Don Fernando de Mernarve.

Mossen Gaspar de Bulach.

Mossen George Marx.

Mossen Nicolas, mayor en hurt (?), with whom (besides their servants) there went two friar minors, Paul and Thomas, who understood many languages.

Mossen Henric, of Schauenberg.

Mossen Caspar de Sienli.

Mossen Sigismund de Marserbach.

Mossen Pedro Velsech.

Mossen John Lazino, archdeacon and canon of the church of Transilva in Hungary.

Father Felix Fabri, of the order of predicadores, lecturer of Ulm, and a very accomplished preacher, who had before been in the Holy Land, a learned man in many ways.

All the above persons, being assembled together, having collected our provisions, on the 24th of August, the festival of St. Bartholomew, set out from the Holy City of Jerusalem, and arrived after sunset at Bethlehem, where we remained two days, visiting the holy places already described. All the troubles and distresses which we underwent in this short journey, from the treachery of the infidels, I have thought fit to suppress.

On the 27th of August, early in the morning, we left Bethlehem; and in the evening arrived at the ancient Ebron, where we saw the Damascene Plain,* the Double Cave,† and other places already described. We then entered the monastery of St. George, where are some Greek monks; and they have there a chain which belonged to the said Saint, which has thirty-nine rings or links, and we put it round our necks, seeing that the Moors did so; because, if any one who is troubled with an evil spirit or with madness puts it on, he is cured immediately, and so they hold it in great veneration: here they show still the footmarks of the horse of this St. George, of the earth of which we carried away a portion.

We set out before daybreak on the morrow, which was the 28th of August; and the sun had set when we arrived at a very large and solitary building, where we remained through the night. Here the mountains come to an end; and a very extensive and delightful plain commences. In the course of this journey we passed near a castle, which they call the St. Samuel; thence inclining to the left is a city, as it is said, of the holy Abraham, where the Moors have established a great hospital, where they distribute food to as many as come there, be they of what nation or sect they may. 1200 loaves are baked there daily

* This plain is mentioned in an earlier part of the work as the spot where Adam was created.

† The burying-place of Adam and Eve and the Patriarchs.

for the poor, and the yearly expenses amount to 24,000 ducats, all of which goes in charity. On the following day, which was the 29th of the said month, we departed for the city of Gazera, and arrived soon after noon, but our entry was delayed till night. This was done by the advice of our Calino, that the ruler of the city might not take away our wine, as he had at other times done to pilgrims. On this day we came to many cisterns for water, which the Moors draw from thence with much labour, and give it to the pilgrims for the love of God. Near to this city of Gazera there was a very large and ancient fig-tree, which bears its figs seven times in a year—they call it the fig-tree of Pharaoh. As soon as night arrived we entered Gazera, where with much trouble we found a covered place to lodge ourselves in, for the hospital of pilgrims was too small for so many persons: at length we were placed in a house, with bad walls, and full of mud, where we continued twelve days under great hardships and much sickness arising from the unwholesome air. Neither were there wanting many frauds and vexations which were put upon us by our Calino and the infidels, which it would be tedious to enumerate.

The above city is twice as extensive as Jerusalem, but in respect of its edifices is far from being equal to it. It is two Italian miles from the sea, and was formerly called Gaza, the capital of the Philistines, spoken of in Judges xvi. &c.

* * * * * * *

On the 9th of September we went into the plain without the city, where we found ready twenty-four camels; and, this being fulfilled, our head Calino took his leave of us, leaving the other, his deputy, according to the agreement we have already mentioned.

The following day we took our way through plains, which were bounded on our right by the sea, and on the left by the Holy Land: straight before us to the S. lay the Great Desert. We halted for the night at Lebhem, a small village one mile from Gazera; this was on account of our sick, who were ill able to travel: here we found no fuel but some poor roots of broom. There was a well of great depth, but it was empty, from which it is said that the blessed Virgin drank in the flight into Egypt.

We departed from Lebhem on the 11th of the said month, over a great plain of which we could see no end, excepting to the westward, where the main sea is its boundary. At length we reached a country called in Arabic Carvatha, and in Latin Cades: here we remained for the night, having pitched our tents under the hollow of a small hill—as ill off for fuel as the first night. Our water was brought from so far that it was fitter to poison than refresh us. It rained a little, as it is wont to do in the evening in those parts; and as far as we could see in the course of our route,

the more desert and uninhabitable the country became, so that we arrived that day in a wilderness where never man nor the son of man had dwelt, for there were neither woods, nor forests, nor trees, but all was desolation and the gloom of death, full of ravines and aridity from the burning heat of the sun. We often saw in that desert an appearance of smoke, as if proceeding from a fire; but afterwards it was ascertained by experience to be the movement and revolution of fine sand and dust borne in the air, for there are small hill-ridges entirely formed by accumulated dust, so that, where there is one day an open track, on the next there is a mountain of sand, and there can thus be no fixed or certain route across this country.

Travelling thus at a foot's-pace, we reached on the following day a placed called Gayon, and there we pitched our tents upon a very white soil in a very wide ravine: no water was to be found, nor any wood, nothing but the roots of herbs. The provisions brought from Gazera failed us, except the biscuit.

The next day, the 13th of September, we struck into the bed of a torrent or very broad ravine, shut in on each side by the mountains, and called by the Arabs Vadalar,* and here we found much colocynth.

On the following day, which was the 14th of the above month, we entered upon a terrible wilderness, more so than on the first of the preceding days, where we saw no living creature, bird or beast, but ostriches, which are the only inhabitants of that desert; and proceeding along, we came amongst mountains of very great height, utterly barren, covered with nothing but stones and crags, and they are called by the Arabs Gebelhelel,† from their barrenness. At night we pitched our tents in a place called Magare.

On the morrow following, in a very cold desert, unusual in the eastern regions: we slept at night in a place called in Arabic Mynschene, where the soil was white, and composed of rubble, and the stones like flakestones of sand, which is called creta.

After passing the night we took our way through a region, the eastern extent of which is unknown, so much so that a man even travelling on horseback could not, in nine days, arrive at any human habitations. Some think that it is the uninhabitable zone, called the torrid, which extends up to the terrestrial Paradise. On this day, which was the 16th September, along the confines of the desert, we arrived at Alberoh.

We proceeded on the next day, the 17th of the month aforesaid, to Mesmar, at the foot of a very high mountain, which they called Caleb, which looks as if formed artificially.

Setting out from thence on the next day, the 18th of the month,

* Wádí Ailah.—Tr. † El-Helál.—Tr.

we passed through a country where the hills and valleys and sands, and even the stones, had the appearance of salt. Thus we arrived at a ravine which is called Aguado (a watering-place); but it belied its name, for there was no water.

Starting the following day, we came to a hill from which we saw the Mountains of the Lord, Horeb and Sinai, on our left, and on our right the Red Sea; but they were yet four days' journey distant from us. From thence, having first refreshed ourselves, we descended on foot, the way being dangerous, with narrow precipices full of stones. At the bottom we remained for a night and day, sheltered in the caverns, to allow our sick to repose. Here was neither water nor wood, nor any green thing.

In the morning of the day following, which was the 20th September, pursuing our journey we entered upon a very steep and rugged mountain, where there was no other description of tree but a thorny one, full of flowers of a sweet odour, which refreshed us. Some say that the crown of our Lord's passion was woven of those thorns: we therefore took some of them with us. This mountain was not sterile, but beset with sharp-pointed rocks and stones, which shone as if they had been anointed with oil, and their colour was a mixture of black and red. There we saw a beast larger than a camel, which our Calino said was a unicorn; and a shepherd came up to us whistling and following his flock, which was a marvel to us, who for so long a time had seen no trace of a human being nor a tame animal. When night came on we set up our tent in a place called Scholïc.

Throughout all the toils and perils of these journeys we had always this consolation, through the intercession of the blessed virgin Saint Catherine, that after midnight a star brighter than the rest showed itself to the south, which they call the star of St. Catherine, which, being over Mount Sinai, showed us the direct way. Whenever we found that we deviated from it, we were sure that we were in a wrong course.

On the 21st of this month we entered a valley to the S., and thence we saw the holy mountain of Sinai, which stood out above the other mountains near it: at the sight of which we much rejoiced, though it was still far from us; but we could not recognise any particular features. Our sight could discern nothing more than a mass, as it were, enveloped in obscurity; and, as the sun was now setting in the W., we pitched our tent in a place called Abalharoh. It is a great plain, surrounded on all sides by lofty mountains, where they say that Moses kept the flocks of the Gentile, Jethro, his father-in-law, who was a priest of Midian; and it is believed that the temple where he kept his idol was not far from thence. In this place we saw a deeply-excavated rock,

in which they say Moses often slept, and abode there, from whence he could see over the whole plain, and keep good watch over his sheep.

The next day, the 22nd of September, very early in the morning, we began to enter the desert by a narrow stony valley, and then came upon a wide and long plain, which extended to the foot of Mount Sinai. The sands which covered it were red, as were the mountains which border it. Here it is believed that the children of Israel dwelt whilst Moses conversed with the Lord on Mount Sinai. We saw a place upon a rock raised like a chair or pulpit, from which it is said that this holy man promulgated the law in presence of the people. When we began to ascend the valley, some Arabs joined our company, and we received no injury from them. Thus journeying along this great plain, near the acclivities of very lofty mountains, we turned into a deep, rugged, and narrow valley, full of stones, which we traversed very slowly, on account of its danger. On our right the monastery of our lady the martyr, St. Catherine, presented itself, situated upon the acclivity of Mount Sinai; the sight of which was a cause of much rejoicing, so many days having passed without our having set eyes upon any dwelling, and now we beheld the end which fulfilled the object of our desire.

[On the thirteenth day after their departure from Gazera, on the first of which they only travelled one mile to Lebhem.]

XIV.—*Note on Some Names of Places on the Shores of the Red Sea.* By A. Thomson D'Abbadie, Esq.

Musawwa', 10th March, 1838.

The following attempt to correct the orthography of names of places in the Red Sea, is, as yet, partial and incomplete. But my approaching journey to Abyssinia will put it out of my power to follow up any longer a subject which becomes more arduous as it advances towards perfection. It had been my wish to examine how far the nomenclature of the ancients would agree with my present corrected chart: but I am sensible that many travellers have not done their duty in withholding their information with a vain desire to give the last polish to a work which might often be better finished by others. Besides, I have but one manuscript, and the difficulties of my intended tour may deprive me of that.

I had the good fortune to meet an eminent Oriental scholar at Jiddah, M. Fresnel, who had taken up his quarters there in order to pursue his researches in the elucidation of Arab tradition prior to the age of Mohammed. He kindly laid aside his manu-

scripts, collected the pilots of the Red Sea, and taught me to distinguish the niceties of Arabic orthography. As it was very often impossible to make the pilots understand the words pronounced, as we supposed them to have been written after the English fashion, it became necessary to perform an imaginary tour from place to place. When among islands we often needed the help of an intelligent pilot from Ḥadramaut, who, being accustomed to consult maps, could better explain, in sea-terms, the relative positions and distances. Every name when received from the pilot was successively pronounced by each one of us, the Arabs present being consulted as to the distinctions between س [s] and ص [ṣ], ح [ḥ] and ه [h], etc., which are not always attended to by the lower class of seamen, to which the pilots generally belong. Even with all these precautions I could not avoid such faults as depend on a difference of pronunciation. Thus, I have written *seil* in some places, and *seyyil* in others.

We have been greatly puzzled by the island of Nahelej, which, in my copy of the chart, is laid down as being totally distinct from Nórah; our Dahlak pilot assured us that there was no large island to the N.E. of Nórah, and that Nahelej, or a name like it, is a spot *in* the isle of Nórah. He likewise knew nothing of a distinct island called Mahoon, although it was evident that he never hesitated in giving the names in their proper order. This uncertainty prevented us from recognizing several small islands near Nórah.

It may not, perhaps, be uninteresting to communicate the names of the points of the compass, which I also owe to M. Fresnel. They are used by every pilot in the Red Sea.

North . .	Jáh.	E. by S. . .	Maṭla' el jauzá.
N. by E. .	Maṭla' el firkid.	E. S. E. . .	—— el tír.
N. N. E. .	—— el na'sh.	S. E. by E. .	—— el iklíl.
N. E. by N.	—— el nákah.	S. E. . .	—— el 'akrab.
N. E. . .	—— el ayyúḳ.	S. E. by S. .	—— el ḥimáreïn.
N. E. by E. .	—— el wáḳi'.	S. S. E. . .	—— el soheïl.
E. N. E. .	—— el sumák.	S. by E. .	—— el sallibár.
E. by N. .	—— el thurayyà.	South . .	—— Ḳoṭb.
East . .	—— Mṭala'.		

Maghríb signifies *West*, and is applied in place of Maṭla, in order to designate the opposite points of the compass: thus, Maghríb el 'Aḳrab, means S.W., &c. These names belong to constellations, but I have not been able to identify more than one or two.*

As the present mode of sailing in the Red Sea has probably been followed during a long course of ages, I shall give you the

* They are explained in the Jihán Numá, p. 61.—F.S.

names of the spots in which we anchored during our voyage from Jiddah to Musawwa', with a northerly wind. Starting at daybreak, Feb. 8th, we halted near sunset at Mersa Raghwán (Rugguan, Engl. Ch.): Feb. 9th, at Mersa Ibráhím, which is the port N.E. of Líth; Feb. 10th, at Fará (Farrar Islands); on the 11th, after 3 hours' stay at Konfodah, we anchored in Halí; the 12th, after having coasted as far as El Barak (el Burk), we crossed the Sea, passing near Fásiliyyat (Warsaleat Island), and on the 19th our pilot recognised the land near Kandálláï (Gandalite). As there is no good anchorage on this coast, we went on to Musawwa', where we arrived on the 16th.

I have also written down all the names from Yembo' to Mokhá.

Names of Places in a Coasting Voyage from Sawákin to Mokhá.

*According to a Dahlak Pilot.**	*English Chart.*	*Remarks.*
Fejj Rá'í-l-kasab	(Omitted)	*i. e.* valley of the Sugar-cane Shepherd.
Mersá Lekák Hindí	Mersa Legakinde / Mersa Hadoo	Both names are used ?
——— Kiláb 'Alí		
——— Hádhiyú (Hádhihu ?)		
——— Hádhinú (Hádhínhu ?)		
——— Al Shabak	Al Shubuc	
——— Sheikh Sa'd	Mersa Sheikh Saad	
——— 'Aikah		
——— Lahm		
——— Kofút		
——— Sha'b Sunbul		
Jezírat el Amír		
——— el Hádí		
——— Melákiyát		Three small islands N. of Ras Mugda.
Rás Mikdam	Ras Mugda	
Mersá Turunj hátet	Trikatatah	
——— Kat'ah Jábinú (já beïn-hu ?)	Guttat Tromba	Here follow seven headlands: they have no names.
Rás 'Asís		
Jezerírat Amarat	Amarat	
Rás Shekab		W. of Amarat.
Jezírat Koban		
Rás el Sáj		S.E. of Rás Shekab.
Jezírat el 'akík, or Bahdúr	Aggeeg, or Badour	
——— hajar		
Rás el Debír	Ras Deber	
——— el 'abíd		
——— Abú Lábis (-l Abis ?)	Aboo Yahbis	
——— or Mersá-lkassár	Ras Casar	Also named Ras Kassár.
Mersá Samad 'Allám		
——— Mandalú (Mandal-hu ?)	Mudaloo	
Rás Teraubah	Serabar (probably)	

* It must be borne in mind that in the names taken from the English chart of the Red Sea the vowels are to be sounded as usual in English; in those from the Dahlak pilot, as in Italian, or as in the English words *father, there, fatigue, cold, rude.*—Ed.

According to the Dahlak Pilot.	*English Chart.*	*Remarks.*
Mersá Rárat	Rarrat	
—— Kabru-sh-sheïkh	Gubroo Sheikh	
—— El berr reyyim		This is the general name of this part of the coast; Karn is synonymous with Rás.
Karn, or Rás 'Adaf	Garna Duff	
—— Kandelláyí	Gundalite	
Jezírah Difneïn	Diffnane	
Mersá Mobárak	Mersa Moobaruck	
—— Ibráhím	Mersa Ebrahim	
—— Inte'silah	Indesilee	
—— Abú Ruba'	Aboo Rubah	
—— Mahallah		
—— Kuba'	Coobach	
—— Ughayyarú		An extensive valley N. of Rás Harb, and which contains fresh water.
Rás Harb	Ras Hurub	
—— Kurkusum		
Mersá Dákhiliyyah (Inner Harbour)		
Rás 'Abd-el-kádir		The headland that projects most N. of Musawwa'.
Jezírah Sheik Sa'íd		S. of Musawwa'.
—— el tawálet (Long Island)		S.W. of Musawwa'.
Harkíkó, or Arkíkó	Argeego	Called Dakhanú (Sorghum Dochna) by the Habáb.
Musawwa',		Called Bati' by the Habáb.
Rás Harár, N. of Musawwa'	Massowah	Called by the Habáb, Bati' Point of land N. of Musawwa.
—— Modar, N. of Musawwa'		W. point of Musawwa' Island.
Jezírah Desei	Dissee	
—— Haudhah (Cistern Island)		Triangular island, N.E. of Deseï Island.
Rás Haudhah (Cistern Head)		First headland E. of Deseï.
Jezírah 'asákir (Army Isles)		Two islands N. of Rás Hawádet.
Rás Kúrelah		Second headland E. of Desei.
—— el Dellemah		Third headland, ibid.
Jezírah Umm-en-námús (Mother-of-Law Island)	Larmoose	
Kurún Duluh, Rás Horeïrah		S. of Umm-en-námús Island.
Jezírah Delkus (Dhá-lkuss?)		
—— Del'íd (Dhá-l'íd, Festival Island)		
—— al 'ajúz (Old Woman)	Adjuce	
Jebel Hawákil	Howakil	
—— Derkamán	Delgamna	
—— Bak'ah	Jibbel Bucker	
—— Seil Bahár	Sarbo	
—— Abú 'Okbah, or 'Akabah		
—— Omm-es-sahríj, or Mersá Endeddeh		This name appears to have been divided and applied to two distinct islands.

According to the Dahlak Pilot.	*English Chart.*	*Remarks.*
Rás Kurmud kebír ——— Saghír		This name is applied to two capes distinguished from each other by the adjectives Kebír and Saghír.
—— Maurakh Hoyó (Haïhu ?)		
Jebel Benát (el Wá) —— Handú	Banat' lar	
—— Dúrefrós	Duroro ?	
—— Hanfilah	Amphila	
Rásu-r-rá 'atán	Ras Ourata	*Rás* Ará'tá ought to be more northerly ?
Rás Kassár	Ras Cussar	
(Rás er-rebát ?)	Ras Scerboot	
Ghubbat Weleleh		This name is given to the whole space from Rás Kassar to Kurdúmiyát Islands.
Jezírat Kurdúmiyát	Coordomeat	
'Eíd	Edd	
Jebel Kudd 'Alí	Coordarlee	
—— Abá 'il	Jibbel Abbelat	
Jibál Rakhamah	White Quoin Hill (?)	
Berr as-súlah, Rás Beïlúl		
Dahlak Bender Mokhá		

Berr Asúlah is the name of the coast which lies between Jibál, Rahmet, and Beïlúl, the Ras Billool of the English chart. As the Arab vessels sail from Rás Beïlul to Bender Mokhá, my Dahlak pilot could not give me any more names on the African coast.

Dahlak, and the Net of Islands which surround it.

According to the Dahlak Pilot.	*English Chart.*	*Remarks.*
Dahlak	Town	
Memlah (Saltern)	Memlah	
Adhal, or Edhel		Town, or village W. of Memlah.
Durbeshah, or Durbesbát	Derboshat	
Erwá	Erwa	
Dúbellú	Doobelloo	
Rás Kusum	R. Goosum	
	Goobanee	
Kunbíbeh	Cumbeeber	
Dásaghau (Dhá-s-saghw ?)		Between the sea and Kúnbibeh, which ought to be more to the E.
Ibárah (Ibárah ?)		W. of Säl'eït.
Säl'eït	Salat	
Jamheïleh		N.W. of Dúbellú.
Jezíratu-n-nokhrá		Nokhrá island at the entrance of the principal bay of Dahlak.

The preceding belong immediately to Dahlak island.

Jezírat Kádó	Kaddo	
Sherm Sáyilah Bádirah	Sale Badera	
——— Hárrah	Harrat	
——— El Abú	Laboo	
——— Nórah (Naúrah, so pronounced)	Nora	

According to the Dahlak Pilot.	*English Chart.*	*Remarks.*
Rás Kubárá (Ḥubárá—Bustard?)		N. point of Nórah island.
—— Dúlbahút	Dulbahout	
—— Berr 'addah	Buradoo	
—— Doḥol	Dohul	
—— Dahreh	Dahrel	

CLUSTER OF ISLANDS AROUND DAHLAK.

According to the Dahlak Pilot.	*English Chart.*	*Remarks.*
Omm 'Alí ('Alí's mother)	Ommarlee	Two islands.
Deheris Melek		First island N.W. Omm 'Alí.
Antúḥ		Second ditto.
Abú Sheráyi'aṭ		Third ditto, or most northerly.
Enta' fúsh	Tookfush	
Ṭurkub		Two islands N. of Enta'fúsh.
Ṭanan	Tunnum	
Wusṭah	Wooster	
Esrátau	Suratoo	
'Awálí Shaúrah	Howallee Shorah	
——— Ḥuṭum (Ḥutub?)	——— huttoob	
Enta' sãnú	Intensnoo	
Esbáb	Usbob	
Hurmíl	Harmeel	
Hukáleh	Hukally	
Seil 'Auber	Sale Amber	
Ante'antur		E. of Ḥukáleh.
Ghabbiḥu		S. of the preceding.
Dulhalam (Dhú-l'Helem)	Dulhulum	
Enta'idel	Entadell?	
Ṭabániyó		Not identified, N.E. near Dulhalam.
Adásí	Hadassee	
Dahreh		W. of Adásí.
Adhgher (Azkár?)	Askar	
Dahreṭu-n-núreh		S. of Azgher.
Seilu-n-núreh		S. of the preceding.
Seil Bal'ah		W. of Seil Núreh.
Durr eṣ-surúm	Durrafroos	
Duru'tam	Bettah	
Ento'ghodaf	Entogacluf	
Dallemet		Near the preceding island—position not identified.
Möseil		
Adbáret	Hadbar	
'Ukúsh		Between the N.W. point of Dahlak Islands and Duḥu.
Dulbu'úd, or Dulkush		Between the same N.W. point and the 'Ukúsh.
Dubiníes		Near the preceding ones.
Derujruj	Derridjeree	
Sarad	Sarod	
Darghelleh	Darghelec	
Durkaham	Durghaum	
Kundábílú }		
Endabir }		N. of Ente terra'.
Enteráñiyá		
Enteterra'	Euteurah	

According to the Dahlak Pilot.	*English Chart.*	*Remarks.*
Mandút		Long sandy island, which terminates the shoal N. of Deseï.
Delfídel (Dhú-l fídal)		
Muta'dhebn	Mursateban	
Síl Seïdthan		Near Muta'dhabn.
Durkamán		Two islands W. of the preceding.
Diladhí 'ah	Dilladeah	
Mahún	Mahoon	
Dehábir		Two islands, one smaller than the other.
Deróm	Derome	
Toweïrah (Little Bird)		N. of the following
Dulkus (Dhú-l kús ?)	Dulkoos	
Akrab	Agrub	
Seïl 'Arabí	Sale Arabee	
Dunnafárik (Dhú-n nafárik)		
Gharíb	Gurreet	
Dhú-l akl	Dulgold ?	
Dhú-l yighaf	Dulgoof?	
Hawátib Kebír	Howatib	
——— Saghír		
Dubí 'ah	Duldeah ?	
Dinísheb		S. of Duldeah of the chart.
Yermálkó	Jermalho	
Sinna'í	Senach	
Ferj*saghálah	Dahret Segarla	
Rajiyum	Rajuma	
Rákah	Rackah	
Músta' milah	Mustarmila	
Weld Muhíreb		S. of Rajúm.
Dhauber	Soober	
Salmá	Salma	
U'kán	Oucan	
Mojeïdí	Moghady	
Durkurúsh (Dhú-l Kurúsh)	Dulgrosa	Dhú-l Kurúsh ? i.e. he who has Kurúsh (piastres).
Mashílghá	Mashilgar	
Belhessú (Bá-l Hasú ?)	Bolhessoo	
Hatítú	Howate ?	
Tehór el jebel	Tor	
Tuhúr el yed (Dhohúr el yed)		W. by S. of Tehúr el jebel.
Derakahu-l bahr	Derakah'	
——— ber		W. of the preceding.
Umm-en-náyim		Somewhere near the preceding.
Hawít	Howate	
Medhbúhah		Close to Hawít.
Musári'	Moosmaree	
Seil Umm 'Alí	Sale Amber	

The first mountain S.W. of Harkíkó is named Jebel Kadam: this is, I suppose, the Geedan of the English chart. Several pilots, questioned by me, knew nothing of *Goob Duenoo.* Ansley Bay appears to have no well-known name. A Dankalí pilot, born in the Isle of Deseï, called this bay Kobb el Káf, or the Velvet Gulf; but, as it is little frequented by those who trade at Musawwa', this name is not understood. Those who answer my

inquiries here, call it Bahr Búrí. The little headland named *Quoin* in the chart, is called here Maka 'nilíyah, from a populous neighbouring village. Somewhere in the south of the bay is Gĕmbúthleh. There are a great many anchorages in the bay: that near Zullah is called Mersá Dólá.

The insulated rock east of Deseï is called Seïl kebír; Seïl Saghír is between the preceding one and Deseï. In this latter isle are 40 spots bearing names: I have collected only the following:—

The principal anchorage bears the name of the island; coasting thence towards the south are Mersá Soránkólah, M. Arakómah Seïl Arakómah (insulated rock), Arakómah Kebír (a little headland), M. Kadedheïnah, M. Lahóshalítah, Rás Górsĕtúleh (south point of the island), Seïl Górsétúleh, M. Hankil Soghaïr, M. Hankil Kebír, Rás Hankil: Seïl Rokúbeleh, is a small cluster of rocks south of Deseï. In the phraseology of the Red Sea, Seïl, sometimes pronounced Seyyil, is an insulated rock emerging from the surface of the water. Mersá is an anchorage, *i. e.* a harbour or roadstead. Tahlah is a shoal barely covered: if very extensive, it is named Rokúk. Baháyir is a shoal in deep water.

[Besides the above list, Mr. D'Abbadie has had the kindness to allow many other names of places on the Society's copy of the Charts of the Red Sea to be corrected from his own copy of that Chart; and Mr. Renouard has corrected the rest.

It is due to Captains Moresby and Elwon of the Indian Navy, who executed this laborious survey of the Red Sea, to state that several names of places mentioned in their "Memoir on the Survey" are unaccountably omitted in the Charts; these names are now being engraved on the plates.

It is much to be regretted that before publishing such valuable Charts, the orthography of the Arabic words was not corrected and reduced to some standard. To remedy this inconvenience as far as possible, the names of places in Arabic, as written by Mr. Rasam, have been engraved, and are now printed on the Charts; and it is intended at the close of the Sailing Directions for the Red Sea, now publishing by order of the Court of Directors of the East India Company, to give a list of all the names of places in the Arabic character, also in the Roman character reduced to one standard of orthography, and the corresponding name on the Chart.—Ed.]

XV.—*An Account of Arctic Discovery on the Northern Shore of America in the Summer of* 1838. By Messrs. Peter Warren Dease and Thomas Simpson. Communicated by I. H. Pelly, Esq., Governor of the Hudson's Bay Company.

Fort Confidence, Great Bear Lake, 15th Sept., 1838.

Hon. Sirs,—It now becomes our duty to report the incomplete success of the expedition to the eastward this summer, in consequence of the extraordinary duration of the ice. Much, however, has been done to prepare the way for another attempt next year; and our hopes, instead of being depressed, are elevated by the knowledge so painfully acquired this season.

On the 6th of June our boats were conveyed on the ice to the mouth of Dease's river (then just open), the ascent of which was commenced the following day. With some assistance from Indians, we reached the portage leading to the "dismal" lakes (discovered by Mr. Simpson last winter) and carried the boats across it without accident. The ice on these lakes was still perfectly solid; and we were provided with iron-shod sledges for the passage. On these we fixed the boats, and, the wind being fair, hoisted sail, which greatly aided the crews on the hauling ropes. In this manner these frozen reservoirs, which are fully 30 miles long, were passed in two days, and we reached our provision station at "Kendall" river on the 19th. There we had the satisfaction to find the two men (left there by Mr. Simpson in April) well, and their Hare Indian hunters successful in the chace. Two of these active fellows consented at once to accompany us along the coast; and proved not only good voyagers, but, during our frequent detentions among the ice, killed so many rein-deer as enabled us to save nearly half our summer stock of provisions. Next day (20th June) we proceeded to the Coppermine river, which we found still fast. It gave way on the 22nd, and we descended all its terrible rapids at full flood, while the ice was still driving. Below the Bloody Fall the river did not clear out till the 26th, and on the 1st of July we pitched our tents at the ocean. Two or three Esquimaux families were seen there, but they took the alarm, and fled over the ice towards some distant islands. Here and on various parts of the coast a fine collection of plants was made by Mr. Dease.

We remained imprisoned in the mouth of the Coppermine, awaiting the opening of the ice, till the 17th of July. Our subsequent progress along the coast was one incessant, we may say desperate, struggle with the same cold obdurate foe; in which the boats sustained serious damage, several planks being more than half cut through. At various points we saw *câches* of the Esquimaux placed upon lofty rocks, out of reach of beasts of

prey; but we did not fall in with any of the owners, who seemed to have all gone inland to kill rein-deer, after their winter seal-hunt among the islands. Fragments of Dr. Richardson's mahogany boats were found widely scattered; and many articles left by his party at the Bloody Fall were carefully preserved in the native keepings. On the 29th of July we at length succeeded in doubling Cape Barrow. The northern part of Bathurst's inlet was still covered with a solid sheet of ice; and, instead of being able to cross over direct to Point Turnagain, we were compelled to make a circuit of 140 miles by Arctic Sound and Barry's Islands. On the easternmost of that group Mr. Simpson discovered, at the base of a crumbling cliff, several pieces of pure copper-ore, and the adjacent islands had also the appearance of being strongly impregnated with that metal. A series of specimens of all the principal rocks along the coast was preserved. In order to attain Cape Flinders, we had to perform a portage across an island, and several over the ice. On the 9th of August we doubled that cape; and in a little bay, three miles to the southward of Franklin's farthest encampment in 1821, our boats were finally arrested by the ice, which encompassed them for twenty-two days! so different was the season of 1838 from that of 1821, when Franklin found a perfectly open sea there on the 16th of August. In June, the early part of July, and the middle of August, we had frequent storms, accompanied by snow and frost; but during the greater part of July and the beginning of August storms prevailed, which, together with the severity of the preceding winter, we consider as the cause of the tardy disruption of the ice this season.

On the 20th of August we were obliged to relinquish all hopes of advancing farther with the boats. That our efforts might not however prove wholly fruitless, Mr. Simpson offered to conduct an exploring party on foot for ten days. It was at the same time arranged between us, that, in the event of any favourable movement taking place in the ice, Mr. Dease should advance with one boat. Signals were agreed upon to prevent our missing each other on the way; and, should we unfortunately do so, the last day of August was fixed for the rendezvous of both parties at Boat Harbour. That unlucky spot is situated in lat. 68° 16′ N., long. 109° 2′ W.; variation of the compass 46° E. Mr. Simpson's narrative of his journey and discoveries to the eastward is annexed.

On the 31st of August we cut our way out of our icy harbour, the grave of one year's hopes; and, having the benefit of fair winds, crossed Bathurst's inlet among Wilmot Islands, and safely re-entered the Coppermine river on the 3rd of September. The following day we proceeded to the Bloody Fall, and there secreted our superfluous provisions. The ascent of the Coppermine

(hitherto deemed impracticable), to near the junction of Kendall river, was accomplished on the fifth day. We deposited the boats in a woody bluff, where they can be conveniently repaired next spring: then, taking our bundles on our backs, we traversed the barren grounds, and returned to winter quarters yesterday.

Here we had the satisfaction to find everything in good order, the buildings rendered more comfortable, and some provisions collected. Our return so much earlier than we ourselves expected on leaving Point Turnagain has enabled us to commence the fall fisheries in good time; and, though our stock of ammunition and other necessaries for the Indians is reduced very low, want no longer stares us in the face, as it did for several months after our arrival here last year. We are most happy to add that the natives have experienced neither famine nor sickness this season; the only death within our knowledge being that of a blind old man.

Sept. 20.—We have the honour to acknowledge the receipt, this afternoon, of Governor Simpson's despatch of 28th February. As things have fallen out this season, it is fortunate that no party was sent down the Great Fish river to meet us. And, from the experience we now possess of the coast to the eastward, we are of opinion that a retreat by the Coppermine may be effected when the entire ascent of the Great Fish river may be no longer practicable. We feel deeply indebted for the confidence reposed in us, and the ample authority granted by the Governor's circular and previous letters to draw upon the resources of all parts of the country. This power we have hitherto used in extreme moderation; and we are glad to say that we are not reduced to the necessity of exercising it any further. One of our men leaves us in consequence of a bad complaint, and has been replaced by a servant from M'Kenzie's river. To chief trader M'Pherson, the gentleman in charge of that district, we are indebted for valuable assistance in many ways: likewise to chief factor M'Leod, of Athabasca: between them, our order of last winter for an additional supply of pemmican, dogs, sledge-wood, leather, ammunition, guns, axes, and tobacco, has been completed; while the prompt and kind attention of chief trader Ross, at Norway House, has fulfilled the private orders of our people, for a part of which we now send to Great Slave Lake. By the same conveyance we discharge our Chipewyan hunters, as we are unable to provide them any longer in clothing.

Since writing the foregoing we have been obliged to condemn one of our two sea-boats. In its stead we shall transport an inland *bateau*, of a rather superior construction (built by Ritch at Fort Chipewyan two years ago), to the Coppermine next June, by the route followed this year, making up the additional hands required to navigate such a craft with Hare Indian hunters. And, to convey the expedition from this dreary abode at the close of

our enterprise, we shall again require the aid of a boat from M'Kenzie's river. We have the honour, &c.

PETER W. DEASE, C.F.
THOMAS SIMPSON.

To the Governor, Deputy Governor, and Committee of the Honourable Hudson's Bay Company, London.

Mr. SIMPSON'S *Narrative of a Journey on foot to the Eastward.*

On the 20th of August, the date appointed for the return of former expeditions from these desolate shores, I left our boats still hopelessly beset with ice, to perform a ten days' journey of discovery on foot to the eastward. My companions were five servants and two Indians. We carried a wooden-framed canvas canoe, and nearly the same other baggage as on the journey to Point Barrow last year, with the addition of a tent for the nightly shelter of the whole party on a coast almost destitute of fuel. Each man's load at starting weighed about half a cwt., and our daily progress averaged 20 geographical miles. About the middle of the first day's journey we passed the farthest point to which Sir John Franklin and his officers walked in 1821. Beyond that, the coast preserved its N.N.E. trending to our encampment of the same night, situated on the pitch of a low cape, which I have named Cape Franklin. From W. to N.E. a new land or crowded chain of islands of great extent, in many places high and covered with snow, stretched along at the distance apparently of 30 miles, and led to the apprehension that we were entering a deep sound or inlet. The mainland now turned off to E.N.E., which continued to be nearly its general bearing for the three following days: it is flat in its outline, our path leading alternately over soft sand, sharp stones, and swampy ground. At the distance of from 1 to 2 miles, the coast is skirted by a range of low stony hills, partially clothed with dull verdure, which send down to the sea numberless brooks and small streams. None of the latter at that season reached above our waists, though the deep and rugged channels of many of them showed that in the spring they must be powerful torrents. Two leagues inland a hill (which I have named Mount George after Governor Simpson) rises to the height of 600 feet, and forms a conspicuous object for a day's journey on either side. The ice all along lay immoveably aground upon the shallow beach, and extended in every direction as far as the eye could reach. The great northern land still stretched out before us, and kept alive doubts of our being engaged in exploring an immense bay, which even the increase in the tides, the quantity of sea-weed and shells, and the discovery of the remains of a large whale and of a polar bear, could not altogether dispel. These doubts seemed almost converted into certainty, as we drew near on the fourth evening an elevated cape,

and saw land apparently all round. With feelings of bitter disappointment I ascended the height, from whose summit a splendid and most unlooked-for view suddenly burst upon me. The ocean, as if transformed by enchantment, rolled its free waves beneath, and beyond the reach of vision to the eastward. Islands of various shape and size overspread its surface; and the northern land terminated in a bold and lofty cape bearing N.E., at least 40 miles distant; while the coast of the continent trended away to the S.E. I stood in fact on a remarkable headland, at the eastern entrance of an ice-obstructed strait. The extensive land to the northward I have called VICTORIA LAND, in honour of our youthful sovereign, and the eastern extremity Cape Pelly, after the Governor of the Honourable Company. To the promontory where we encamped I have attached the name of Cape Alexander, after an only brother, who would give his right hand to be the sharer of my journeys. The rise and fall of the tide there was about 3 feet, being the greatest observed by us in the Arctic seas. The coast here changes its character, the water becomes deep, the approach easy, and I have little doubt that the islands contain secure harbours for shipping. Next morning, at the distance of 8 or 9 miles, we crossed another high cape, formed of trap-rocks, in lat. 68° 52′ N.; the variation of the compass being 63° E. The travelling had become more and more toilsome, our road now passing over some miles of round loose stones; and then through wet mossy tracts sown with large boulders and tangled with dwarf willows. At our usual camping hour we opened a large bay, studded with islands, which ran in for 8 miles to the S.S.W., and then turned off in a bold sweep of rounded granitic hills (like those near Melville Sound and Cape Barrow), dipping to the sight in the E.S.E. at the distance of 30 miles. To walk round even the portion of the bay in view would have consumed three days; the time allotted for outgoing was already expired; and two or three of my men were severely lame, from the fatigue of their burdens, the inequalities of the ground, and the constant immersion in icy-cold water. I besides cherished hopes that, by making the best of our way back, we might, agreeably to my arrangement with Mr. Dease, meet him bringing on one of the boats, in which case, with an open sea before us, we could have still considerably extended our discoveries before the commencement of winter. I may here remark that we were singularly fortunate in the five days of our outward journey, the weather being so moderate and clear that I daily obtained astronomical observations: whereas, before our departure from the boats, and during our return to them, we had continual storms, with frost, snow, rain, and fogs. Close to our farthest encampment appeared the site of three Esquimaux tents of the preceding year, with a little stone chimney apart. We passed the remains of a

larger camp, and several human skeletons, near Cape Franklin; but nowhere throughout the journey did we find recent traces of that few and scattered people.

'The morning of the 25th of August was devoted to the determination of our position, and the erection of a pillar of stones on the most elevated part of the point. After which I took possession of the country, with the usual ceremonial, in the name of the Honourable Company, and for the Queen of Great Britain. In the pillar I deposited a brief sketch of our proceedings, for the information of whoever might find it. Its situation is in lat. 68° 44′ N., long. (reduced by C. F. Smith's watch from excellent lunars at the boats) 106° 3′ W.; the magnetic variation being 60° E. The compass grew sluggish and uncertain in its movements as we advanced eastward, and frequently had to be shaken before it would traverse at all. Two miles to the southward of our encampment a rapid river of some magnitude discharges itself into the bay, the shores of which seemed more broken and indented than those along which we had travelled. Independently of Victoria Land, and an archipelago of islands, I have had the satisfaction of tracing fully 100 miles of coast, and of seeing 30 miles farther, making in all (after deducting Franklin's half-day's journey already mentioned) about 120 miles of continental journey. This is in itself important; yet I value it chiefly for having disclosed an open sea to the eastward, and for suggesting a new route, along the southern shores of Victoria Land, by which that open sea may be attained, while the mainland (as was the case this season) is yet environed by an impenetrable barrier of ice. Whether the open sea to the eastward may lead to Ross's Pillar, or to the estuary of Back's Great Fish river, it is hard to conjecture, though the trending of the most distant land in view should rather seem to favour the latter conclusion.

The same evening, on our return, we met the ice at Trap Cape driving rapidly to the eastward. As we proceeded, the shores continued inacessible, but open water was now everywhere visible in the offing. Several bands of buck reindeer were migrating to the southward along the hills; two which we shot were in far superior condition to those in Bathurst's Inlet and near the Coppermine. A few musk-oxen were also seen; and numerous flocks of white geese (*Anser hyperboreus*), generally officered by large grey ones (*A. Canadensis*), were assembling in the marshes, and taking their aërial flight to more genial climates. At dusk, on the 29th of August (our tenth day), we regained the boats, and found them still enclosed in the ice, which the N. and westerly gales seemed to have accumulated from far and near towards Point Turnagain.

(Signed) Thomas Simpson.

XVI.—*Results of Thermometrical Observations made at* Sir Edward Parry's *several Wintering-Places on his Arctic Voyages, and at Fort Franklin.* By Dr. Richardson, F.R.S. &c., Physician to Haslar Hospital.

The Transactions of the Royal Society of Edinburgh for 1826 contain Sir David Brewster's discussions of an hourly register of the temperature at Leith Fort, kept for two years (1824 and 1825), from whence he deduced,

1. The form and character of the mean daily curve for each month, season, and the entire year; and the mean temperature of the same periods.
2. The two times of the day when the mean temperature occurs.
3. The relation between the mean temperature of the 24 hours, and that of any single hour, or pair of similar hours.
4. The average daily range for each month.
5. The parabolic form of the branches of the annual daily curve.

The results of this paper appeared to be of such importance, that the Mathematical Committee of the British Association for the Advancement of Science on their first meeting at York, recommended a similar register to be kept in the south of England, remarking that "we want nothing but the combination of a sufficient number of trustworthy observations, in order to obtain results of primary importance to science, and which may one day enable us to arrive at the true form of the daily and annual curves of mean temperature, with a precision almost mathematical. In order, however, to extend the benefit of such investigations, it is absolutely necessary that they should be pursued in different latitudes." (p. 43.) This recommendation was ably acted upon at Plymouth by Mr. Snow Harris, and the fifth report of the Association contains two years' hourly observations at Plymouth Dock, arranged and discussed by him according to Sir David Brewster's method.

Convinced of the importance of investigating the phenomena of diurnal temperature in various latitudes, I have thought that a discussion of the thermometrical observations made on Sir Edward Parry's several voyages would be a service rendered to science. Though this task involved a very considerable sacrifice of time, I was induced to undertake it from a knowledge of the great accuracy with which the temperatures were registered on the arctic voyages, and a full persuasion that the results would adequately repay the labour required. It is true that the observations were made at intervals of two hours instead of hourly, and that the ships being generally under way for almost two

months out of the twelve, varied their latitudes more or less in that time,* but many years are likely to elapse before equally extensive and accurate registers are kept in these high latitudes, notwithstanding that drawback.

The inaccuracy of most, if not of all thermometers made in England for very low temperatures, and particularly the discordance between the mercurial and spirit thermometers at temperatures below zero, are sources of error affecting materially all winter observations in the high latitudes. On comparing 12 thermometers, made by London artisans of high repute, by hanging them side by side in the open air at Fort Franklin for many days, I found that at + 32° they stood within half a degree of each other, but when the temperature sunk to 40° below zero, they differed widely,—the two extreme ones as much as 10°, those giving mean indications were of course selected for use. The subjoined note † will show that the difference between mercurial and spirit thermometers is well known though not remedied.

* During the navigation of Lancaster Strait or Hudson's Bay, the temperature is likely to be more or less frequently influenced by masses of ice drifting with the southerly current from higher latitudes, yet this is in some measure compensated by the ice generated on the spot being carried off by the same current.

† "M. Flauguerges, of Viviers, compared with peculiar care and attention a spirit of wine thermometer, constructed under the eye of Reaumur, with mercurial octogesimal ones made by the best modern artists. The experiments were often repeated with the following results:—

Spirit of Wine.	Mercurial.	Spirit of Wine.	Mercurial.
+80·0	+66·8	0·0	0·0
75·6	63·5	− 3·5	− 3·4
56·½	49·6	− 5·0	− 4·9
32·7	29·8	−12·7	−12·4
13·8	12·7	−17·4	−16·6
10·5	9·6	(*Ed. Journ. of Science*, i. p. 374."	

" Dr. Wildt, of Hanover, made the following observations on thermometers, also divided by Réaumur's scale:—

Spirit of Wine.	Mercurial.	Spirit of Wine.	Mercurial.
+80·00	+80	+ 7·95	+10
73·90	75	3·90	5
67·95	70	0·00	0
62·14	65	− 3·75	− 5
56·48	60	7·36	10
50·97	55	10·82	15
45·60	50	14·13	20
40·38	45	17·30	25
35·31	40	20·32	30
30.38	35	23·19	35
25·60	30	25·92	40
20·97	25	28·50	45
16·48	20	*Ed. New Phil. Journ. for*	
12·14	15	1826, p. 327."	

Sir Edward Parry says, " we found, on comparing ten thermometers, (of which three were mercurial and seven of alcohol,) a difference of no less than 7½° between them, their indications ranging between − 22·5°, and − 30°. At higher temperatures the difference was inconsiderable."—(*Second Voy.*, p. 132.)

Sir Edward Parry's thermometrical registers were obtained from the Admiralty, on application to Captain Beaufort, the Hydrographer. In ascertaining the sums of the temperatures for each hour of the month, I had the assistance of Serjeant Drake, Clerk of Melville Hospital, the sums being calculated both by him and myself separately, and the results compared. All the subsequent calculations were made entirely by myself, and I endeavoured by a variety of cross checks, to avoid the errors which might otherwise have crept in, as the arithmetical operations, though of the simplest nature, were necessarily very numerous and tedious. In deducing the curves of the seasons or years, the error which would have arisen from the unequal lengths of the months, had their mean temperatures been used, was obviated by dividing the sums of all the temperatures for each hour of the period by the number of days. In like manner the mean temperature of each month and of the whole year was always obtained by dividing the gross sum of the recorded temperatures for these periods by the number of observations. Throughout the paper the model furnished by Sir David Brewster has been followed as strictly as circumstances would admit.

Section I.

Observations at Melville Island.

The following tables are the results of registers of temperatures recorded every 2 hours, for an entire year at Melville Island. Two independent registers were kept;—one on board the *Hecla*, Captain Parry, and the other in the *Griper*, Lieutenant Liddon. Table I. contains the daily and monthly mean temperatures from the Hecla's register; Table II. the sums and monthly means from the *Griper's* journal, for the purpose of comparison. Tables III., IV., and V. are entirely from the latter. The registers commence with September and end with August; and the ships were stationary in Winter Harbour from the 5th of September till the 1st of August. Winter Harbour is situated in lat. 74° 47′ N., long. 110° 48′ W. In the four first days of September the ships in sailing to the westward from long. 107° 14′ to 110° 50′, had varied their latitude only 11 miles, or from 74° 58′ to 74° 47′ N. August was mostly occupied in endeavouring to sail along Melville Island, the greatest departure westward from Winter Harbour being 3° of longitude: the difference of latitude from that of Winter Harbour throughout the month, was from 10 to 20 miles, except in the three or four last days, when the ships on their return sailed from lat. 75° to 74° 02′, the latter position

being 45 miles south of Winter Island, and the greatest departure in the whole year from the parallel of the usual place of observation. The ground was covered with snow from September till towards the end of May, when patches of soil began to appear and pools of water to form, and on the 24th of that month there was a smart shower of rain: but even late in June there was much snow lying in the valleys of the interior. The ships when at sea during the time embraced by the register, were always surrounded by masses of floating ice—and Sir Edward Parry remarks that, "In the whole of the steep coast (of Melville Island) whenever we approached the shore, we found a thick stratum of blue and solid ice, firmly imbedded in the beach, at the depth of from 6 to 10 feet under the surface of the water." This ice he suggests, "has probably been the lower part of heavy masses forced aground by the pressure of floes from without, and still adhering to the viscous mud of which the beach is composed, after the upper part has in course of time dissolved." But it may have been a protruding stratum of frozen soil containing much water, laid bare by the friction of the floating masses of ice, and this is the more probable from the observation which follows:—"From the tops of the hills in this part of Melville Island a continuous line of this sub-marine ice could be distinctly traced for miles along the coast."—*Parry's Voy. of Disc.*, p. 235.

By calculation, excluding the effects of refraction, the sun ought to have been below the horizon for 96 days at the winter solstice, or from the 4th of November till the 8th of February, but its upper limb was actually seen from the mast head on the 11th of November, and it was again seen from the maintop on the 3rd of February, the actual period of its absence having been only 84 days. On the 1st of May it was seen at midnight from the high grounds, giving, for its continuance above the horizon about the summer solstice, a period of 104 days.

The temperatures were registered on board the ships, but Sir Edward Parry observes, that "by a register which was kept by Captain Sabine at the Observatory, it was found that the thermometer invariably stood at least from 2° to 5°, and on one or two occasions, as much as 7° higher on the outside of the ships than it did on shore, owing probably to a warm atmosphere, created by the constant fires kept on board." The temperatures shown by thermometers at the ships are used in the tables without correction.

TABLE I.—Containing the daily and monthly mean temperatures for one year (1819-20), deduced from observations made every two hours on board the Hecla, at Melville Island. Lat. 74° 47′ N.

Day.	1819. Sept.	Oct.	Nov.	Dec.	1820. Jan.	Feb.	March.	April.	May.	June.	July.	August.
	°	°	°	°	°	°	°	°	°	°	°	°
1	+33·00	+ 6·83	− 1·00	−30·29	−18·33	−20·87	−31·33	− 6·33	+ 8 58	+36·29	+40·58	+36·21
2	32·79	+12·83	+ 3·25	32·96	24·58	31·75	25·60	− 8 37	6·25	34 17	40·50	34·17
3	34·17	+ 8·75	+ 3·92	16·04	34·62	39·58	31·33	−18·71	9·25	35·50	43·83	35·92
4	31·83	+ 9·83	+ 5·50	31·71	40·17	39·96	27·92	−14·75	7·67	35·63	39·83	35·62
5	30·58	+ 3·00	− 0·67	31·25	32·00	29·12	16·50	−16·62	11·58	34·87	44·33	34·08
6	27 96	− 1·80	−14·08	27·00	28·58	20·71	2·50	−18·75	3·83	32·17	47·67	33·96
7	28·42	+ 6·10	−11.12	22·29	37·67	24·62	6·17	−21·00	0·79	29·63	47·42	34 92
8	30·00	+ 3 75	−10·04	19·67	35·83	28·92	18·35	−20·46	3·00	32·08	48·75	36·46
9	30·67	− 1·83	−12·75	18·83	34·42	25·83	8·58	−21·85	4·67	33·92	43·58	34·79
10	31·00	+ 1·83	− 9·67	19·33	36·17	31·62	4·96	−22·96	5·62	32 25	45 67	31·96
11	27·75	+ 4·54	−18·62	11·21	41·42	39·77	2·25	−19·67	4·17	33·92	43·33	31·29
12	29·50	− 4·17	−28·58	14·42	44·71	42.00	21 00	−20·00	8·62	32·54	43·75	34·29
13	26·08	+ 7 60	−28·50	10·96	45·29	41 58	22 71	−22·92	7·62	33 46	46·00	36·92
14	13·79	− 2·50	−26·08	8·29	35 08	46·33	17·83	−19·37	7·50	34·75	48·25	33·22
15	18·92	+ 6·17	−30·88	11·63	35·73	40·92	16·25	− 7·33	9·42	34·67	43·00	32·33
16	21·25	− 5·20	−39·79	13·50	37·08	32·33	21·79	−12·33	12·67	33·75	42·37	32·42
17	19·75	−12·88	35·63	4·37	24·50	33·42	17·58	−13·62	18·50	34 58	51·08	31·83
18	23·67	− 6·08	−36·00	5 00	10·25	26·25	8·88	− 8·17	18 00	37·33	43·12	33·08
19	29·83	−11·25	−42·92	17·46	17·50	21·04	13 75	− 4·00	17·75	37 67	43·17	33·96
20	17·25	−15 12	−43·71	22·83	24·46	24·08	11·88	− 2·21	16·96	36·25	40·50	31·67
21	15·83	−10·58	− 27·79	23·50	19·00	30·25	15·63	− 3·17	18·83	38·17	40·33	30·92
22	19 67	− 6·92	−23·00	31·00	26·00	36·58	13·75	− 4·63	23·00	44·33	45·04	31·79
23	22·08	+ 0·12	−25·	33·83	22·50	37·67	22·42	+ 4·00	27·29	42·08	39·17	31·58
24	20 25	− 2·83	−15·	31·17	24·83	40·92	21·5[illegible]	+10·42	32·71	37·00	41·83	31·79
25	13·58	+ 3·71	−11·75	26·04	26·42	34·54	26·71	+ 4·88	36·33	37·[illegible]2	43·58	32·29
26	5·00	− 1·08	− 21·79	16·21	31·17	26·33	25·50	− 1·17	33·04	40 50	36·92	23·92
27	15·00	− 10·25	−18·38	24 58	33·96	27 75	26·17	+ 0·08	39·17	39·33	34·67	27·83
28	17·33	−19·75	−28·29	36·75	37·23	29·08	24·17	+ 4·83	34·96	37·17	37·29	23·12
29	11·25	−24·25	−31·92	37·38	26·12	29·07	23·88	+12·75	[illegible]·54	41·92	34·58	29·00
30	5·92	−26·15	−33·58	38·96	19·58	..	20·29	+20·38	31·08	43·75	37·25	30·00
31	..	−12·17	..	7·17	24·54	..	11·50	..	30·92	..	36·96	31·75
Means	+22·80	− 3·22	−20·56	−21·79	−30·09	−32·17	−18·07	− 8·37	+16·66	+36·24	+42·41	+32·68

Mean temperature of the year on board the *Hecla*, from 4392 observations . . . . . +1°·49 Fahr.

TABLE II.—Results of observations on board the *Griper*, same place and times, 4392 observations, of which the sum is +6049·9 = Mean of year +1·38° Fahr.

Sums	+8106·5	−1052·0	−7611·3	−8041·5	−11636·0	11293·0	−6760·0	−2956·0	+6254·5	+13036·0	+15792·5	+12119·.
Means	+ 22·52	− 2·83	− 21·14	− 21·62	− 31·28	− 32·45	− 18·19	− 8·21	+ 16·82	+ 36.21	+ 42·45	+ 32·5[illegible]

In the Griper, Lat. 74° 12′ N. 1819-20. Griper.

Mean temp. of the autumn months, viz. Sept., Oct., Nov. . . . . . . − 0.43° F.

,, ,, winter months, viz. Dec., Jan., Feb. . . . . . . − 28·36 F.

,, ,, spring months, viz. March, April, May . . . . . . − 3·13 F.

,, ,, summer months, viz. June, July, August . . . . . . + 37·09 F.

Mean temp. of one year, from Sept., 1819, to Oct., 1820, inclusive, 4392 observations . + 1·38° F. Hecla.

,, ,, ten days about the summer solstice, viz. from 16th to 25th June inclusive + 37·83 F. −37·86° F.

,, ,, ,, ,, ,, winter solstice, viz. from 16th to 25th Dec. inclusive − 20·79 F. −20·87 F.

NOTE.—Owing to the breaking of the thermometer, the observations in the Griper were interrupted for 26 hours on the 23-24th Nov. The hourly means for that month were deduced from the observations actually recorded, and the mean of the month was obtained by interpolating 26 observations at the mean rate.

Table. III.—Showing the mean temperature of every alternate hour for each month, and for the whole year, from observations made on board the Griper at Melville Island, lat. 74° 47′ N., in the year 1819-20:—

Hour.	1819. Sept.	Oct.	Nov.	Dec.	1820. Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Mean temp. of each hour for the year.
	°	°	°	°	°	°	°	°	°	°	°	°	°
A.M. 2	+21·40	−4·13	−21·56	−23·03	−30·61	−32·78	−21·44	−14·57	+11·77	+33·53	+38·64	+30·26	−0·91
4	21·28	4·03	21·74	23·52	31·10	32·88	20·69	13·87	12·02	33·77	39·35	30·47	−0·80
6	21·53	3·[illegible]7	21·28	23·20	31·34	33·16	20·39	12·15	13·42	35·03	41·34	31·24	−0·11
8	21·95	3·13	20·83	22·87	31·82	32·78	19·10	9·23	15·31	36·23	42·63	32·83	+0·88
10	23·07	2·28	20·46	21·49	31·37	32·05	16·73	5·93	18·02	37·55	44·03	34·31	+2·34
Noon.	23·70	1·53	20·55	20·95	31·48	31·26	14·73	3·70	20·22	38·55	45·24	35·19	+3·35
P.M. 2	23·53	1·00	19·82	20·74	30·73	31·07	14·11	1·33	21·39	38·40	45·90	34·74	+3·88
4	23·55	1·39	20·36	20·61	30·85	31·74	15·48	1·43	21·73	38·48	45·10	34·03	+3·54
6	23·10	2·94	20·30	20·82	31·32	32·48	17·13	4·17	20·71	37·75	44·55	33·15	+2.63
8	22·87	3·15	20·84	20·16	31·47	32·81	18·34	8·02	18·37	36·50	42·79	32·27	+1·62
10	22·63	2·98	21·02	20·56	31·48	33·0[illegible]	19·61	11·17	15.42	35·10	40·50	31·53	+0·56
12	21·60	3.61	21·95	21·44	31·77	33.34	20·48	12·97	13·39	33·63	39·35	30·97	−0·44
Means	+22.52	−2·83	−21·14	−21·62	−31·25	−32·45	−18·19	− 8·21	+16·82	+36·21	+42·45	+32·59	+1·38

The mean temperature for the whole year, from 4392 obs. in the Griper, is +1·38° F.

Note.—The curves for the months, plate i., fig. 1, are projected from the respective columns of the above table; and the mean annual curve for lat. 74° 12′ N. in plate ii., fig. 7, from the last column.

Table IV.,—Showing the mean temperature of each alternate hour of the four seasons of the year at Melville Island, lat. 74° 47′ N., from observations on board the *Griper*, in the year 1819-20:—

Hours.	Autumn; Sept. Oct. Nov.	Winter; Dec. Jan Feb.	Spring; Mar. Ap. May.	Summer; June, July. Aug
	°	°	°	°
A.M. 2	−1·46	−28·72	−7·94	+34·15
4	−1·52	29·08	−7·44	34·53
6	−1·20	29·15	−6·31	35·88
8	−0·70	29·05	−4·29	37·21
10	+0·01	28·22	−1·50	38·64
Noon.	+0·52	27·82	+0·65	39·67
P.M. 2	+0·88	27·43	+2·01	39·70
4	+0·58	27·65	+1·64	39·21
6	−0·08	28·12	−0·16	38·49
8	−0·40	28·07	−2·60	37·20
10	−0·49	28·26	−5·05	35·72
12	−1·35	28.76	−6·51	34·66
Means	−0·43	−28·36	−3·13	+37·09

Table V.,—Showing the mean temperature of each alternate hour for six summer and six winter months, at Melv. Island, lat. 74° 47′ N., in the *Griper*, 1819-20:—

Hours.	Winter; Sept. to Feb. incl.	Summer; March to Aug. incl.
	°	°
A.M. 2	−15·09	+13·11
4	15·30	13·54
6	15·18	14·78
8	14·89	16·42
10	14·06	18·57
Noon.	13·65	20·16
P.M. 2	13 25	20·86
4	13·54	20·42
6	14·10	19·18
8	14·22	17·30
10	14·37	15·33
12	15·05	14·02
Means	−14·39	+16·98

Note.—From these two tables the curves of the four seasons in plate ii., fig. 1, and of the summer and winter halves of the year, plate ii., fig 6, were projected.

Table VI.,—Containing the highest and lowest temperatures for each month, the means of the daily *maxima* and *minima* for each month, and the means of these, or of the extreme daily temperatures, from the *Hecla's* register at Melville Island, in 1819-20:—

Month.	Highest Temp. in the month.	Lowest Temp. in the month.	Means of Max.	Means of Min.	Means of the Extremes.
1819	°	°	°	°	°
Sept. .	+37·0	− 1·0	+25·30	+18·47	+21·88
Oct. .	+17·5	−28·0	+ 1·60	− 8·34	− 3·37
Nov. .	+ 6·0	−47·0	−16·55	−21·93	−20·74
Dec. .	+ 6·0	−43·0	−16·69	−26·74	−21·72
1820					
Jan. .	− 2·0	−47·0	−25·34	−34·10	−29·72
Feb. .	−17·0	−50·0	−28·07	−36·43	−32·25
March .	+ 6·0	−40·0	−12·05	−24·55	−18·30
April .	+32·0	−32·0	− 0·30	−17·32	− 8·81
May .	+47·0	− 4·0	+23·48	+ 9·29	+16·39
June .	+51·0	+28·0	+40·23	+32·10	+36·17
July .	+60·0	+32·0	+49·06	+36·81	+42·94
Aug. .	+45·0	+22·0	+36·55	+29·19	+32·87
Means	+ 24·04	−14·50	+ 6·65	− 3·62	− 3·02

The highest temperature registered in the year took place at two P.M. on July 17th, and was + 60° F. The lowest was registered on Feb. 15th, at four A.M., and was —50°. The lowest temperature registered on the ice was —55°; and for seventeen hours on the 14th and 15th of February the temperature did not rise above —54° Fahr.

SECTION II.

Observations at Port Bowen.

The ships Hecla, Captain Parry, and Fury, Captain Hoppner, remained from September 27th to July 20th, at Port Bowen, in lat. 73° 14′ N., long. 88° 56′ W. Between the 1st and 27th of September the latitude was varied from 74° 27′ N., to that of the winter quarters, or 73 miles, and between the 20th of July and the end of August, the most southerly position attained was 72° 46′ N., and the most northerly 73° 48′ N., the greatest difference of latitude from that of Port Bowen being only 27 miles. The sun was invisible in the middle of winter for 121 days, but the exact number of days on which it was actually under the horizon was not ascertained on account of the weather being hazy for some time at its disappearance; yet as it was seen from the high lands on the 2nd of February, the time of its absence may be fixed at 84 days. Snow of the preceding year was not gone when the ships entered Port Bowen; that which fell in the winter began to leave the stones about the end of April, and towards the end of May a great deal was dissolved daily, but pools of water did not form till the first week in June. The salt-water ice formed during the winter reached its maximum thickness of 86½ inches in May. The summer (of 1824) preceding the commencement of this register was considered by Sir Edward Parry as unusually cold, the mean temperature of August being about 6 degrees lower than that of August 1825, included in the register.

Table VII.—Containing the daily and monthly mean temperatures for one year (1824-5), deduced from observations made every two hours on board the Hecla, at Port Bowen, lat. 73° 14′ N.

Day.	1824.				1825.							
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	August.
	°	°	°	°	°	°	°	°	°	°	°	°
1	+27·88	+16·87	− 1·17	−16·42	− 24·17	−32·87	− 31·46	− 29·58	+ 5·12	+ 32·46	+ 39·34	+ 35·68
2	31·04	15·46	+ 2·92	18·37	26·62	38·29	42·96	− 27·75	5·88	29·92	38·62	36·50
3	30·25	10·01	+ 5·28	14·25	28·62	33·12	29·29	−23·08	5·58	33·46	40·46	38·62
4	30·04	21·25	+ 7·08	18·17	29·58	22·83	31·29	−23·67	4·84	31·83	35·86	38·50
5	31·00	26·21	+ 9·50	21·58	33·54	22·96	29·33	−28·54	3·46	35·29	36·17	41·83
6	30·79	25·96	− 3·54	18·17	31·92	15·83	29·58	−28·25	13·33	36·67	37·17	36·17
7	30·29	20·04	−13·12	9·25	33·87	21·50	35·29	− 25·04	16·04	36·29	39·58	34·46
8	29·12	14·86	− 6·25	13·83	28·46	33·54	28·37	−20·88	19·25	36·86	39·75	35·50
9	29·62	18·08	+ 4·62	15·25	22·42	38·17	27·92	−16·79	22·29	36·42	39·00	40·83
10	27·25	15·62	+ 5·58	15·58	31·54	35·96	30·08	−10·67	11·00	33·79	39·71	41·73
11	23·46	15·50	+ 1·12	11·13	36·87	30·00	34·04	+ 2·46	6·29	32·50	41·67	37·42
12	18·96	14·71	−11·04	10·58	38·08	12·54	32·21	+12·29	8·25	35·25	41·08	37·46
13	19·77	15·71	− 9·79	20·04	24·04	14·00	30·46	− 1·42	11·62	33·96	45·42	40·54
14	21·42	24·83	− 6·29	25·29	18·08	25·79	32·23	− 9·54	17·75	35·21	40·75	42·50
15	21·67	17·83	+ 5·08	30·54	25·67	31·12	27 62	−10·42	23·27	32·92	41·79	44·79
16	19·79	21·50	−13·21	33·21	29·58	32·50	25·50	− 1·83	18·50	37·96	40·75	39·67
17	22·14	15·62	−11·29	27·96	28·29	18·25	24·38	− 2·92	21·96	38·83	41·75	34·67
18	18·79	13·42	−13·04	22·08	21·92	28·96	23·04	− 2·71	21·17	38·25	38·67	32·58
19	22·33	6·37	−18·04	14·83	17·67	33·25	21·50	− 1·71	20·21	37·58	33·42	33·00
20	26·12	1·83	−19·42	19·54	24·17	39·42	22·29	+ 6·67	20·08	35·92	39·33	32·92
21	26 96	3·96	−11·96	29·17	28·50	40·35	21·33	+10·87	22·33	36·54	37·58	32·95
22	25 05	2·08	−13·54	26·67	27·58	31·92	29·17	+ 8·08	21·04	38·17	38·62	31·92
23	26·21	2·96	−13·08	30·04	27·83	26·46	30·46	+ 6·87	20·50	39·50	41·25	32 29
24	28·17	5·87	− 6·83	17 83	36·21	26·71	33·50	+ 3·17	16·87	38·25	36·00	34·96
25	23·08	6·17	−16·92	20·58	40·12	30·37	33·54	+ 6·92	21·50	37·29	35·75	31 75
26	22·64	5·17	−16·12	25·71	38·00	17·17	23·92	+ 2·21	27·25	37·42	36·12	33·37
27	32·75	1·00	+12·12	16·92	26·50	10·17	18·00	+ 3·54	26·75	41·50	38·92	33·54
28	29·17	− 7·87	+ 1·92	9·21	30·37	20·92	22·75	+ 3·67	31·87	39·25	40·00	33 83
29	24·78	− 4·50	+ 2·00	11·79	28·25	...	23·42	+ 0·96	23·83	37·87	39·08	32·58
30	25·96	− 8·92	− 2·46	12·29	26·37	...	24·92	+ 2·21	28 71	36·42	35·23	27·50
31	...	− 1·29	...	14·21	31·50	...	28·71	...	33·25	...	36·17	30·79
Means	+25·88	+10·85	− 5·00	−19·05	− 28·91	−27·32	− 28·37	− 6·50	+17·63	+ 36·12	+ 38·87	+ 35·77

Mean temperature of the year on board the Hecla from the above table . . . . . . + 4°·33

Table VIII.—Results of the same set of observations (except for July and August, which were made in the Fury*), arranged by the hours, and placed here for comparison. Sum + 18965·8. Mean of year + 4·33.

Sums	+9326·5	+4028·5	−1804·0	−7085·0	−10736·0	−9177·0	−10550·5	−2312·0	+6555·5	−13003 3	−14460·5	−13306·0
Means	+ 25·91	+ 10·83	− 5·01	− 19·05	− 28·91	− 27·31	− 28·36	− 6·51	+ 17·62	+ 36·12	+ 38·87	+ 35·77

In the Hecla, Port Bowen, Lat. 73° 14′ N.	°
Mean temp. of the autumn months, viz. Sep., Oct., Nov.	+ 10·58 F.
" " winter months, viz. Dec., Jan., Feb.	− 25·02
" " spring months, viz. March, April, May	− 5·74
" " summer months, viz. June, July, August	+ 36·93
Mean temp. of one year, from Sept. 1824 to August 1825, inclusive, 4380 observations . .	+ 4·33
" " 10 days about the summer solstice, viz. from 16th to 25th June, inclusive .	+ 37·83
" " winter solstice, viz. from 16th to 25th December inclusive . . .	− 24·19

* Note.—The register of observations kept in the Hecla, and deposited in the Admiralty, being defective for July and August this year, the Fury's register was referred to, but as after the loss of this vessel in the middle of August, the register was discontinued, the remainder of that month was filled up from Sir E. Parry's printed Journal, from which the whole of the daily means in Table VII. were also extracted.

Table IX.—The mean temperature of every alternate hour for each month and for the whole year, from observations made on board the Hecla, at Port Bowen, in the year 1824–25, in lat. 73° 14′ N.

Hour.	1824.				1825.								Mean of each hour for the year.
	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	
	°	°	°	°	°	°	°	°	°	°	°	°	°
A.M. 1	+25·30	+10·40	− 4·50	−18·89	−29·05	−27·55	−31·42	−12·53	+ 12·42	+31·93	−36·47	−34·35	+ 2·40
3	25·53	10·37	5·02	18·79	29·16	27·32	31·11	−12·70	12·81	32·98	36·90	34·43	2·57
5	25·33	10·11	5·12	18·58	29·29	27·36	31·41	−11·47	15·31	34·28	37·68	34·43	2·99
7	25·57	10·69	5·53	18·61	29·31	27·07	30·29	− 7·52	17·63	36·83	38·56	35·37	4·02
9	26·22	11·13	5·42	18·45	28·61	26·68	26·22	− 3·50	20·34	38·10	39·77	35·92	5·38
11	26·35	11·92	5·47	18·47	28·33	26·61	23·92	− 0·85	20·98	39·58	40·98	36·97	6·27
P.M. 1	26·78	11·94	5·42	19·11	28·69	27·12	22·68	+ 0·85	22·14	39·61	41·21	36·98	6·55
3	26·75	11·53	5·38	19·65	28·82	27·02	23·72	+ 0·13	21·94	39·53	40·76	37·37	6·24
5	26·32	11·15	5·12	19·42	28·76	27·30	26·44	− 2·88	19·52	36·70	39·85	37·18	5·24
7	25·97	10·90	4·35	19·74	28·89	27·61	29·74	− 6·63	17·85	35·22	38·79	36·31	4·25
9	25·50	10·13	4·28	19·34	28·95	27·82	31·48	− 9·87	16·08	34·72	38·22	35·53	3·37
11	25·28	9·68	4·53	19·50	29·08	27·66	31·89	−11·08	14·45	32·95	37·26	34·37	2·68
Means	+25·91	+10·83	− 5.01	−19·05	−28·91	−27·31	−28·36	+ 6·50	+17·62	+36·12	+38·87	+35·77	+ 4·33

Mean temperature of the year by 4,380 obs. (sum + 18965·8) is + 4·33° Fahr.

TABLE X.—Showing the mean temp. for each alternate hour of the four seasons in the year 1824-5, at Port Bowen, lat. 73° 14′ N.

Hours.	Autumn; Sep. Oct. Nov.	Winter; Dec. Jan. Feb.	Spring; March, April, May.	Summer; June, July, Aug.
	°	°	°	°
A.M. 1	+10·10	−25·06	−10·50	+31·25
3	10·30	25·02	10·31	34·77
5	10·11	25·00	9·17	35·46
7	10·25	24·93	6·72	36·92
9	10·65	24·51	3·12	37·93
11	10·95	24·41	1·27	39·18
P.M. 1	11·11	24·91	+ 0·10	39·27
3	10·99	25·29	− 0·56	39·22
5	10·79	25·09	3·27	37·91
7	10·84	25·34	6·17	37·11
9	10·45	25·29	8·41	36·16
11	10·11	25·31	9·49	34·86
Means	+10·58	−25·02	− 5·74	+36·93

TABLE XI.—Showing the mean temp. of each alternate hour of six summer and six winter months, from the same set of observations.

Hours.	Winter; Sep to Feb. incl.	Summer, March to August, inclusive
	°	°
A.M. 1	−7·24	+11·89
3	7·26	12·24
5	7·35	13·15
7	7·24	15·10
9	6·83	17·40
11	6·63	18·95
P.M. 1	6·80	19·68
3	7·06	19·33
5	7·05	17·33
7	7·15	15·47
9	7·38	13·88
11	7·51	12·70
Means.	−7·12	+15·60

NOTE.—From table ix. plate i. fig. 2. is projected; from table x. plate ii. fig. 2; from table xi. plate ii. fig. 6; and plate ii. fig. 7, partly from the last column of table ix.

TABLE XII.—Containing the highest and lowest temperatures of each month, the means of the daily maxima and minima for the several months and the whole year, and also the means of these, or of the extremes for the same times, from the Hecla's register kept at Port Bowen.

Month.	Highest Temp. in the month.	Lowest Temp. in the month.	Means of Maxima.	Means of Minima.	Means of Extremes.
1824.	°	°	°	°	°
September	+ 34·0	+ 16·0	+ 28·07	+ 23·18	+ 25·62
October	+ 31·5	− 12·0	+ 14·39	+ 6·58	+ 10·48
November	+ 17·0	− 26·0	+ 1·33	− 9·98	− 4·32
December	− 4·5	− 35·0	− 14·92	− 22·76	− 18·84
1825.					
January	− 14·5	− 42·5	− 25·27	− 32·24	− 28·76
February	− 8·0	− 45·0	− 22·96	− 31·86	− 27·42
March	− 9·0	− 47·5	− 21·44	− 34·76	− 28·10
April	+ 20·0	− 37·0	+ 1·97	− 14·78	− 6·41
May	+ 39·0	− 7·5	+ 24·40	+ 11·13	+ 17·77
June	+ 47·0	+ 23·0	+ 40·74	+ 30·16	+ 35·45
July	+ 50·0	+ 30·0	+ 41·63	+ 33·53	+ 37·58
August	+ 51·0	+ 25·0	+ 39·29	+ 32·47	+ 35·88
Means.	+ 12·12	− 13·21	+ 9·21	− 0·52	+ 4·34

The highest temperature occurred on the 15th of August, at 5 p.m. + 51·0. The lowest temperature occurred on the 2nd of March at 7 a.m. — 47·5.

SECTION III.

Observations at Igloolik.

The *Fury* and *Hecla* cruized in the entrance of the strait which bears their name, from the 1st of August, when this year's register commences, varying their latitude little until the end of October, when they were secured for the winter at Igloolik, a small island lying a little south of the strait. The latitude of this place is 69° 21′ N., and the longitude 81° 53′ W. The ships remained shut up in the ice here till after the year of observation was completed. The upper limb of the sun was seen at noon on the 2nd of December, about one-sixteenth of its whole disk being visible from the *Fury's* deck, over the low land to the southward. This was six days after it would have set, independent of refraction. The exact date of its reappearance in January could not be ascertained, owing to the sky being overcast for a fortnight after the 5th, on which day the sky was so red in the south at noon, that the sun was looked out for from the mast-head, but without success. Its period of absence is probably about 38 days. About the summer solstice the sun was visible at midnight for 58 or 60 days, eight or ten of which are due to refraction, which at a low temperature amounts on the horizon to three degrees or more.* The snow continued to cover the land late in June, and on the 11th of that month travelling parties suffered severely from snow-blindness. This affection seldom appears after stones or patches of land have become visible. The ice on the lakes was at this time from five to seven feet in thickness.

The thermometrical registers in both ships have been reduced that their results may be compared, and the means of both are used for calculating and projecting the various curves.

* *Vide* Mr. Fisher's Papers on Solar and Terrestrial Refraction, in the Appendix to Parry's Second Voyage.

Table XIII.—Containing the daily and monthly mean temperatures for the year 1822-23, from observations made every two hours on board the Fury, at Igloolik, in the Fury and Hecla Straits, lat. 69° 21′ N.:—

Day.	1822.					1823.						
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.
	°	°	°	°	°	°	°	°	°	°	°	°
1	+32·75	+30·00	+17·58	+ 0·08	−16·42	−43·75	−17·25	−36·58	−11·42	+ 5·33	+24·17	+39·08
2	36·04	31·83	13·83	−14·50	27·92	42·50	+ 8·92	35·79	− 6·04	11·33	19·25	36·07
3	39·37	27·58	14·67	−17·67	19·17	44·17	+13·58	36·54	− 6·17	10·92	22·29	36·50
4	34·54	27·58	12·42	−16·79	16·33	41·92	+ 1·62	36·75	− 3·92	25·42	26·25	37·96
5	34·33	27·17	10·92	− 9·92	19·17	38·21	− 5·29	32·08	− 8·33	23·96	26·00	37·67
6	37·42	24·71	7·67	−12·08	18·50	31·21	10·00	23·67	−13·92	32·00	2[illegible]·33	37·67
7	35·25	22·92	7·42	−21·75	23·9[illegible]	26·42	19·71	25·33	−15·38	34·75	28·67	39·17
8	33·42	25·58	22·12	−18·50	30·62	22·00	18·17	22·17	− 8·42	35·62	31·00	37·00
9	32·92	25·08	19·83	+ 1·46	38·35	15·00	9·42	19·42	+ 0·96	38·12	28·83	34·42
10	36·37	25·37	24·17	− 8·17	40·42	2·17	24·87	23·42	+ 3·00	30·0	33·50	39·58
11	33·96	26·33	23·33	−26·04	40·42	11·71	13·25	28·33	− 3·92	29·96	32·50	38·17
12	31·04	30·29	21·08	27·25	39·29	13·92	11·79	26·08	− 0·67	24·25	25·75	35·58
13	34·04	30·42	23·61	28·37	36·58	3·25	18·42	14·71	− 8·12	20·00	29·50	38·89
14	33·04	27·83	16·79	24·00	28·42	+17·50	20·54	13·29	−13·33	23·46	31·50	40·37
15	34·42	24·25	17·33	20·21	26·67	+16·42	27·08	19·29	−15·04	30·79	34·42	45·80
16	33·17	25·83	17·38	18·08	32·50	+ 1·83	40·54	21·67	− 7·12	21·29	35·92	45·75
17	32·62	17·33	12·25	15·25	30·83	− 2·25	35·67	18·58	− 0·83	23·12	31·83	49·75
18	34·08	13·21	8·33	14·17	33·33	0·29	31·00	21·50	+ 7·58	20·25	33·12	51·83
19	35·75	14·29	14·25	3·50	31·00	13·08	37·00	15·17	− 5·42	18·42	30·00	50·33
20	24·58	18·00	8·83	16·88	21·42	19·83	29·00	11·42	0·00	17·58	33·00	39·25
21	32·67	25·88	4·67	21·67	17·04	20·17	20·58	9·08	− 3·50	18·00	32·37	40·08
22	32·71	27·66	−1·71	27·67	14·17	21·42	20·46	8·71	+ 3·17	22·12	35·33	37·92
23	33·08	26·92	−5·54	30·83	14·29	30·42	26·75	10·54	+ 4·42	26·17	35·25	39·17
24	34·92	22·25	+8·33	31·25	13·25	29·87	30·83	8·67	+ 2·33	28·83	41·67	39·92
25	33·62	18·90	7·25	31·59	21·00	22·83	33·67	3·88	+ 6·00	31·17	38·75	39·58
26	32·67	28·42	5·88	25·33	28·96	21·08	21·62	12·21	+ 3·50	38·21	38·83	38·67
27	32·75	27·96	9·67	24·71	32·96	+ 0·67	34·33	10·08	+ 9·75	27·00	39·83	43·17
28	30·71	24·75	12·37	26·96	33·25	− 3·37	38·33	18·46	+17·42	32·45	38·50	38·58
29	30·42	17·29	13·67	28·67	36·50	7·92	..	18·71	+18·92	31·25	41·67	40·42
30	32·42	17·75	13·50	20·83	38·83	16·75	..	15·92	+ 4·17	19·42	42·33	36·25
31	29·92	..	14·62	..	38·37	20·04	..	14·03	..	18·25	..	36·17
Means	+33·71	+21·45	+12·75	−19·32	−27·82	−17·06	−20·49	−19·70	− 1·66	+24·78	+32·12	+39·97

Mean temperature of the year on board the Fury, from 4380 obs. (sum +23269·5) is . +5·313° F.

Table XIV.—Results of 4380 obs. in the Hecla, same hours, year, and place, of which the sum is + 26789·0, and the mean is +6·116° F.

	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.
Sums	+12668·5	+9267·0	+5464·0	−6478·0	−10667·5	−5658·0	−6275·0	−6815·0	−14·0	+9490·0	+11595·5	+14211·0
Means	+34·06	+25·74	+ 14·69	−17·99	−28·68	−15·21	−18·68	−18·32	−0·04	+25·51	+32·21	+38·20

Seasons.	*Lat.*	*Fury.* °	*Hecla.* °
Mean temp. of the autumn months, viz. Sept., Oct., Nov.	.	+6·03 F.	+7·56 F.
" " winter months, viz. Dec., Jan., Feb.	.	−21·83	−20·93
" " spring months, viz. March, April, May	.	+1·17	+2·41
" " summer months, viz. June, July, Aug.	.	+35·27	+34·85
Mean temp. of one year, by two sets of observations, each recorded 4380 times	.	+5·31 F.	+6·12 F.
Mean temp. of ten days about the summer solstice, viz. from 16th to 25th June inclusive	.	+34·72 F.	
Mean temp. of ten days about the winter solstice, viz. from 16th to 25th Dec. inclusive	.	−23·08	

TABLE XV.—Showing the mean temperature of every second hour for each month, and for the whole year, from observations made on board the Fury, at Igloolik, in the Fury and Hecla Straits. Lat. 69° 21′ N., in the year 1822-3.

Hour.	1822.					1823.							Mean temp for each hour.
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	
A.M. 2	+31·27	+22·57	+11·43	−19·30	−28·02	−17·9[illegible]	−21·57	−23·61	− 88·7	+18·39	+24·92	+35·48	+ 2·23
4	31·58	22·78	11·43	19·37	27·82	17·61	21·98	23·89	− 5·77	19·47	25·57	36·32	2·48
6	32·11	22·95	11·52	18·92	27·90	17·48	22·09	23·95	− 7·32	21·26	29·40	38·16	3·32
8	33·48	24·52	12·11	18·30	28·16	17·53	21·50	21·24	− 2·87	24·97	32·63	40·74	5·08
10	34·68	25·58	14·27	18·47	27·37	16·87	19·32	17·08	+ 2·00	27·79	35·30	42·06	7·10
Noon.	35·37	26·87	15·23	18·33	27·15	15·05	17·38	15·13	+ 5·33	30·19	37·22	43·79	8·58
P.M. 2	36·76	27·03	14·71	18·45	27·16	15·26	17·04	12·03	+ 6·70	30·85	37·70	44·26	9·10
4	36·69	26·48	13·87	18·90	27·90	16·14	19·52	13·79	+ 5·80	29·59	37·95	43·84	8·36
6	34·93	25·17	13·18	20·25	27·65	17·29	20·77	17·58	+ 2·37	28·06	35·83	42·19	6·69
8	33·34	23·98	12·39	20·48	27·92	17·50	21·39	20·47	− 2·10	24·95	34·40	39·48	5·06
10	32·45	23·05	11·40	20·80	27·97	18·19	21·71	22·71	− 5·62	21·37	28·63	37·32	3·28
12	31·81	22·43	11·45	20·27	28·84	17·84	21·61	24·03	− 7·23	20·06	25·00	35·97	2·48
Means	+33·71	+24·45	+12·75	−19·32	−27·82	−17·06	−20·49	−19·70	− 1·66	+24·78	+32·12	+39·97	+ 5·31

The mean temp. for the whole year in the Fury, from 4380 obs. (sum +23275·0°) was +5·31° Fahr.

TABLE XVI.—Mean temperature same times and place, from observations made on board the Hecla.

Hour.	1822.					1823.							Mean temp. for each hour.
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	
A.M. 2	+32·55	+24·18	+13·40	−17·52	−28·76	−16·19	19·04	−21·77	− 5·93	+18·68	+24·57	+34·03	+ 3·33
4	32·68	24·03	13·61	17·63	28·92	16·18	19·82	22·03	− 6·17	19·87	26·13	34·84	3·52
6	33·37	24·55	14·02	17·73	28·79	15·61	19·86	21·58	− 5·17	22·32	29·47	36·48	4·45
8	33·92	25·88	14·49	17·25	28·69	15·55	19·98	20·10	− 1·20	25·39	33·22	40·03	6·01
10	34·99	27·12	15·90	16·93	27·72	14·84	18·04	16·58	+ 4·00	29·16	37·13	41·39	8·13
Noon 12	35·63	27·72	17·05	17·18	27·68	13·90	16·00	14·19	+ 5·57	32·26	38·87	42·03	9·34
P.M. 2	35·40	27·48	16·29	17·33	28·02	13·60	16·32	12·13	+ 6·40	32·42	39·33	42·03	9·49
4	35·58	27·08	15·65	17·88	28·68	14·36	17·79	13·55	+ 5·47	30·90	37·70	40·81	8·58
6	34·72	26·30	14·55	19·27	29·19	15·19	18·36	17·13	+ 2·57	27·84	34·80	38·42	6·83
8	32·90	25·52	14·37	19·45	29·19	16·21	19·39	19·26	− 0·30	24·81	31·90	37·22	5·49
10	33·14	24·60	13·55	19·05	29·15	15·69	19·57	20·35	− 2·30	21·94	27·83	36·06	4·41
12	32·77	24·43	13·39	18·68	29·47	15·19	19·95	21·16	− 3·40	20·55	25·57	35·06	3·82
Means	+34·06	+25·74	+14·69	−17·99	−28·68	−15·21	−18·68	−18·32	− 0·04	+25·51	+32·21	+38·20	+ 6·12

The mean temperature for the whole year, in the Hecla, from 4380 obs. (sum +26789·0) was +6·12° Fahr.

TABLE XVII.—Means of the two preceding sets of observations.

Hour.	1822.					1823.							Mean temp. for each hour.
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	
A.M. 2	+31·91	+23·37	+12·42	−18·41	+28·39	−17·05	−20·30	−22·69	− 7·40	+18·53	+24·7[illegible]	+34·76	+ 2·78
4	32·13	23·40	12·52	18·50	28·37	16·89	20·90	22·96	− 7·47	19·67	25·85	35·58	3·00
6	32·74	23·75	12·77	18·32	28·35	16·55	20·97	22·77	− 6·24	21·79	29·43	37·32	3·88
8	33·70	25·20	13·30	17·77	28·42	16·54	20·74	20·67	− 2·03	25·18	32·92	40·39	5·54
10	34·83	26·35	15·08	17·70	27·53	15·86	18·69	16·83	+ 3·30	28·47	36·21	41·73	7·61
Noon.	35·50	27·29	16·14	17·76	27·41	14·48	16·69	14·66	+ 5·45	31·23	38·04	42·91	8·96
P.M. 2	36·08	27·26	15·51	17·89	27·59	14·43	16·68	12·53	+ 6·55	31·64	38·51	43·15	9·29
4	36·14	26·79	14·76	18·39	28·25	15·25	18·65	13·67	+ 5·63	30·40	37·82	42·32	8·47
6	34·83	25·73	13·86	19·76	28·40	16·24	19·56	17·35	+ 2·47	27·95	35·31	40·31	6·76
8	33·62	24·74	13·38	19·96	28·54	16·85	20·39	19·86	− 1·20	24·88	33·15	38·35	5·27
10	32·79	23·82	12·48	19·92	28·56	16·94	20·64	21·53	− 3·96	21·65	28·23	36·39	3·84
12	32·29	23·43	12·42	19·47	29·15	16·52	20·78	22·60	− 5·32	20·31	25·73	35·52	3·15
Means	+33·88	+25·09	+13·72	−18·65	−28·25	−16·13	−19·58	−19·01	− 0·85	+25·14	+32·16	+39·09	+ 5·71

The mean of the whole year, by 8760 observations, was $+5°\cdot71$ Fahr.

Plate i. fig. 3 is projected from Table xvii., the last column being also used in the construction of Plate ii. fig. 7.

TABLE XVIII.—Showing the mean temp. of each alternate hour of the four seasons of the year 1822-23, at Igloolik, in the Fury and Hecla Straits, from 8760 obs. on board the Fury and Hecla, lat. 69° 21′ N.—

Hours.	Autumn, Sept. Oct. Nov.	Winter, Dec. Jan. Feb.	Spring, March, April, May.	Summer, June, July, Aug.
	°	°	°	°
A.M. 2	+5 87	−21 97	−3 82	+ [illegible] 53
4	5 88	22 09	−3 54	31 21
6	6 14	21 [illegible]9	−2 56	35 21
8	6 98	21 93	+0 86	35 70
10	7 [illegible]	20 76	+5 00	37 61
Noon	8 64	19 6[illegible]	+7 [illegible]6	38 8[illegible]
P.M. 2	8 36	1[illegible] 67	+8 57	[illegible]9 26
4	7 7[illegible]	20 78	+7 17	[illegible]8 76
6	6 69	21 16	+1 37	36 83
8	6 15	21 58	+1 30	35 [illegible]6
10	5 53	22 09	−1 [illegible]5	32 [illegible]2
12	5 54	21 1[illegible]	−2 51	31 [illegible]4
Means	+6 80	−21 38	+ 1 79	+35 07

TABLE XIX.—Showing the mean temp. of each alternate hour for six summer and six winter months, deduced from the same two sets of observations, making together 8760.—

Hours.	Winter, Sept. to Feb. incl.	Summer, March to Aug. incl.
	°	°
A.M. 2	−7 [illegible]7	+13 36
4	8 03	13 85
6	7 [illegible]	15 42
8	7 [illegible]0	18 [illegible]
10	6 [illegible]	21 [illegible]0
Noon	5 [illegible]1	25 09
P.M. 2	5 57	[illegible]3 91
4	6 4[illegible]	[illegible]5 12
6	7 31	20 60
8	7 85	18 18
10	8 [illegible]0	15 69
12	[illegible]29	14 37
Means	−7 21	+18 15

NOTE.—Plate ii., fig. 3. is constructed from table xviii. and plate ii. fig. [illegible], partly from table xix.

TABLE XX.—Containing the highest and lowest temperatures of each month, the means of the daily *maxima* and *minima* for the several months and the whole year, and the averages from the combination of these for the same periods, from the Fury's register, kept in 1822-23, at Igloolik.—

Months.	Highest temp. in the month.	Lowest temp. in the month.	Means of Maxima.	Means of Minima.	Means of Extreme.
1822	°	°	°	°	°
Aug.	+[illegible]0 0	+[illegible]7 0	+37 90	+30 [illegible]0	+31 15
Sept.	+5[illegible] 0	+11 0	+2[illegible] 02	+20 [illegible]	+2[illegible] 18
Oct.	+[illegible] 0	− 9 0	[illegible] 63	[illegible]	+1[illegible] 92
Nov.	+ [illegible] 0	− 2[illegible] 0	−11 52	−[illegible] [illegible]	−1[illegible] 45
Dec.	−10 0	−[illegible] 0	−[illegible] 18	−31 8	−[illegible]7 85
1823					
Jan.	+22 0	−15 0	−12 05	−2[illegible] 1[illegible]	−17 [illegible]
Feb.	+21 0	−[illegible]5 0	−14 86	−27 [illegible]	−[illegible]0 95
March.	+[illegible]4 0	−11 0	−12 17	− 6 [illegible]1	−19 [illegible]
April.	+32 0	−[illegible]5 0	+ 8 70	−12 57	− 1 [illegible]
May.	+49 5	− 8 0	+32·74	+1[illegible] 0[illegible]	+ [illegible]1 38
June.	+[illegible]52 0	+ 8 0	+[illegible] [illegible]0	+[illegible]5 75	+[illegible]1 8
July.	+[illegible]9 0	+30 0	+[illegible]1[illegible] 10	+34 73	+40 [illegible]
Means	+2[illegible] [illegible]6	−14 17	+11 16	− 0 71	+[illegible] 23

The highest temp. occurred on July the 19th, at ten A.M., and was +5[illegible] 0. The lowest temp. occurred on the 1st of January at eight P.M., and was —45·0.

SECTION IV.

Observations at Winter Island.

The wintering place thus named lies in lat. 66° 11′ N., and long. 83° 11′ W. The ships entered it in the beginning of October, and remained there till after the close of the register. This commences with July, which was spent in Hudson's Straits, between the parallels of 61° and 64° N. lat. August was consumed in Foxe's Channel and Frozen Strait, within the parallels of 65¼° N. lat., and 66½° N.; and September, mostly at anchor in Five-hawser Bay or Safety Cove, in latitudes 66° 32′ N. and 66° 36′ N. During the winter there was generally more or less open water in the offing, producing near the horizon a dense frost smoke. As late as December, and even January, there was no "old ice" visible for many miles, the sea being then covered with a thin sheet of "young ice," the produce of a single day. On the shortest day there was three hours' daylight for writing in the cabin, and about five hours for convenient walking on shore. The ships were for the first time in the season, after entering their winter quarters, enveloped in a fog on the 2nd of May. The dissolution of the snow proceeded rapidly in that month; on the 5th pools began to form by its melting; and on the 7th its average depth on the ice was 8 inches, being double its depth in March. The thermometers were, as usual, hung on the outside of the ships in the shade, and both registers are discussed, the curves being calculated for each, and also for the means of the two.

Table XXI.—Containing the daily and monthly mean temperatures for one year (1821—22), deduced from observations made every two hours on board the Fury, at Winter Island, lat. 66° 11′ N.

Day.	1821. July.	August.	Sept.	Oct.	Nov.	Dec.	1822. Jan.	Feb.	March.	April.	May.	June.
	°	°	°	°	°	°	°	°	°	°	°	°
1	+ 30·50	+ 35·17	+ 39·25	+30·50	+20·25	−17·54	−19·79	− 20·92	−24·25	− 6·37	+ 7·67	+ 34·91
2	30·71	36·25	35·58	+29·71	+13·08	23·67	22·08	23·42	3·37	− 3·58	13·42	30·25
3	30·08	34·75	32·92	+25·00	−11·96	26·83	21·58	28·92	14·50	+ 0·83	25·96	34·91
4	32·87	34·67	33·87	+19·25	− 1·71	17·67	15·75	32·67	25·37	− 1·17	22·92	35·29
5	33·46	37·58	32·67	+16·12	+ 4·33	5·75	22·50	31·54	25 92	+ 2·08	2[illegible]·33	30·79
6	35·18	38·25	35·75	+15·37	+18·33	+ 0·33	19 04	27·33	19·83	+ 3·75	21·04	30·00
7	34·58	38·50	34·46	+13·12	+20·67	+ 0·33	18·46	21·42	4·83	− 3·00	22·92	33·46
8	33 42	35·58	35·00	+ 8·04	+18·00	− 4·25	19·33	25·29	+ 7·33	+ 7·42	21·75	26·42
9	35·42	36·50	31·51	+18·12	+15·08	16·33	20·04	20·25	+ 7·00	+ 3·87	25·42	27 00
10	35·58	38·42	32·46	+11·17	+16·04	17·50	9·42	26·46	−10·62	+ 6·08	21·42	29·58
11	35·17	38·50	33·67	+ 2·67	+21·96	20·50	1[illegible]·29	26·08	−13·71	+ 7·71	1[illegible]·67	32·92
12	35·96	35·01	35·25	+ 6·62	+27·50	19·21	19·96	24·92	15·67	+ 7·21	15·75	30·33
13	35·96	34·50	35·92	+10·33	+21·79	22·25	22·67	22·33	0·17	+ 1·87	17·25	32·33
14	34·46	35·67	34·58	+ 3·71	+20·71	25·50	23 75	25·29	1·37	+ 1·75	22·25	31·17
15	34·83	40·50	34·96	+ 5·12	+24·50	18 33	22·25	9·92	12·12	+ 2·96	25·17	27·00
16	33·42	41·42	32·46	+ 3·17	+ 9·12	11·12	20·29	23·42	23 75	+ 0·33	24·00	36·83
17	36·83	41·75	26·54	+12·67	+ 0·17	8·42	18·62	22·92	17·75	+ 0·79	25·50	37·92
18	36·92	37·87	28·12	+18·92	+ 3·83	10·58	28·46	31·17	18·00	+ 4·46	22 83	39·25
19	39·25	39·01	29·01	+ 9·58	+ 6·50	13·00	30·00	33·33	21·25	+ 4·67	15·83	37·75
20	39·17	38·12	27·17	− 1·08	+10·17	9·00	33·00	30 42	19·42	+ 8·58	17·08	36·75
21	38·83	33·67	26·08	− 6·33	+ 9·00	11·33	33·29	25·17	12 42	+ 8·08	20·21	34·83
22	35·50	33·75	29·12	−10·17	+ 7·37	4 67	28·33	19·67	18·00	+10·50	27·96	35·33
23	38·54	32·29	26·96	− 0·25	− 3·25	4·00	30 71	21·33	16·96	+10·17	31·08	35·46
24	36·50	32·42	24·29	+ 0·42	− 7·42	3·67	21·92	27·42	14·17	+ 5·87	32·29	36·50
25	31·29	32·46	29·12	+16·42	+ 0·08	+ 1·00	19·54	28·71	18·54	+13·67	25·42	37·67
26	36·83	32·92	29·37	+22·96	− 5·01	− 1·08	26·46	17·75	9·62	+21·12	25·67	37·00
27	39·83	34·17	27·12	+23·13	−17·42	5·00	32·79	18·54	6·12	+24·33	29·17	36·67
28	35·83	36·08	23·86	+17·50	−15·08	16·79	34·00	32·42	7·92	+ 9·96	23·12	38·50
29	37·58	37 83	24·17	+18·37	+ 0·33	22·42	30·58	...	+ 2·75	+ 3·42	25·00	37·75
30	34·58	41·37	26·92	+24·[illegible]	+ 4·92	23·33	18·67	...	− [illegible]·38	+ 7·88	24·33	31·00
31	34·71	39·58	...	+22·67	...	23·08	18·25	...	− 2·00	...	29·17	...
Means	+ 35 38	+ 36·60	+ 31·06	+12·51	+ 7·74	−12·91	−22·99	−24·97	−11·64	+ 5·51	+23·09	+ 33·85

Sum of the col. in preceding table + 3506·43, divided by 365, gives as the mean temp. of the year + 9·60.

Table XXII.—Results of observations in the Hecla, same place and times, by 4380 observations, of which the sum is + 41830·0 and the mean + 10·00.

	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June
Sums	+13126·0	+13816·0	+11581·5	+5128·7	+2894·5	−5[illegible]85·5	−8695·0	−7745·5	−3686·5	+2696·0	+8757·5	+11689·0
Means	+ 35·29	+ 37·14	+ 32·17	+13·79	+ 8·04	−15·55	−23·27	−23·05	− 9·91	+ 7·49	+23·54	+ 32·47

Seasons	Lat. 66° 11′ N.	Fury. °	Hecla. °
Mean temp. of the autumn months, viz. Sept. Oct. Nov.		+ 17·11	+ 18·00
" " winter months, viz. Dec. Jan. Feb.		− 20·13	− 20·58
" " spring months, viz. March, April, May		+ 5·66	+ 7·01
" " summer months, viz. June, July, August		+ 35·31	− 34·99
Mean temp. of one year, by two sets of observations, each recorded 4380 times		+ 9·63	+ 10·00

Mean temp. of ten days about the summer solstice, 16—25th June incl. . . + 36·83 F.
" " about the winter solstice, 16—26th Dec. inclu. . . . − 26·42 F.

Note.—In the copy of the Fury's Meteorological Journal deposited at the Admiralty, the temperature for the 17th and 18th of June are erroneous, those for the same days of May having been inserted by mistake. The error was detected by comparison with the Hecla's Journal, and with Sir E. Parry's narrative, where the true means of those days are printed.

Table XXIII.—Showing the mean temperature of every alternate hour for each month, and for the whole year, from observations made on board the Hecla at Winter Island, Lat. 66° 11′ N., in the year 1821-22.

Hour.	1821. July.	1821. Aug.	1821. Sept.	1821. Oct.	1821. Nov.	1821. Dec.	1822. Jan.	1822. Feb.	1822. March.	1822. April.	1822. May.	1822. June.	Mean temp. of each hour for the year.
	°	°	°	°	°	°	°	°	°	°	°	°	°
A.M. 2	+32·48	+34·56	+30·90	+12·03	+ 7·53	−15·35	−23·84	−23·96	−12·93	+ 2·97	+15·48	+28·27	+ 7·49
4	32·53	35·02	30·97	11·95	7·45	15·37	23·90	24·04	12·68	2·70	17·32	28·98	7·73
6	33·56	35·72	31·35	12·74	7·67	15·55	23·52	23·86	12·22	5·28	20·68	30·23	8·66
8	34·70	36·84	31·92	13·44	7·98	15·28	23·00	23·52	10·97	7·57	23·44	33·03	9·84
10	36·55	38·06	32·95	14·79	8·67	14·90	22·93	22·25	8·53	10·88	26·65	35·53	11·45
Noon.	37·00	38·89	33·47	15·45	8·70	14·79	22·32	21·43	7·00	13·12	29·89	37·68	12·54
P.M. 2	37·97	39·18	33·28	15·61	8·80	15·24	22·35	21·21	6·10	12·83	30·60	36·45	12·65
4	37·82	39·22	33·33	15·16	8·65	15·48	22·81	21·95	6·84	11·43	30·03	35·65	12·19
6	36·81	38·50	32·88	14·56	8·10	15·68	23·47	23·00	9·13	9·32	27·03	33·48	10·95
8	35·08	37·22	32·43	13·95	8·08	16·13	23·85	23·71	10·58	6·27	23·90	30·98	9·72
10	34·45	36·55	31·62	13·18	7·53	16·34	24·06	23·82	10·61	3·97	19·65	30·00	8·67
12	33·47	35·90	30·95	12·59	7·28	16·53	24·42	23·88	11·32	3·53	17·84	29·33	8·05
Means	+35·29	+37·14	+32·17	+13·79	+ 8·04	−15·55	−23·37	−23·05	− 9·91	+ 7·49	+23·54	+32·47	+10·00

The mean temperature of the year in the Hecla, from 4380 observations (sum 43776·7) +10·00° Fahr.

TABLE XXIV.—Mean temperature same times and place, from observations on board the Fury.

Hour.	1821.						1822.						Mean temp. of each hour for the year.
	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	
	°	°	°	°	°	°	°	°	°	°	°	°	°
A.M. 2	+33·06	+34·29	+29·53	+11·39	+ 7·15	−12·64	−23·87	−26·27	−14·06	+ 1·43	+14·19	+28·12	+ 7·03
4	33·29	34·63	29·83	11·21	7·38	13·00	23·93	25·87	14·39	1·43	15·58	29·43	7·30
6	33·95	35·18	29·90	11·16	7·27	12·64	23·37	25·82	13·83	2·63	21·00	31·93	8·28
8	34·97	36·40	30·35	12·00	7·83	12·48	22·43	25·20	12·42	5·03	22·84	34·76	9·47
10	36·42	37·50	31·77	13·35	7·98	11·95	21·45	24·00	10·90	8·60	25·84	36·98	11·02
Noon.	37·42	38·24	32·45	14·60	8·70	12·29	21·22	22·61	8·47	9·83	28·35	38·97	12·17
P.M. 2	37·92	39·15	32·70	15·06	8·35	12·56	21·81	22·43	7·87	9·93	29·60	39·33	12·45
4	37·58	38·56	32·65	14·02	8·33	13·31	22·72	23·29	8·65	8·95	29·64	38·19	11·84
6	36·85	37·60	31·98	13·37	7·85	13·50	23·37	24·91	10·21	7·15	27·52	36·15	10·72
2	35·48	36·56	31·28	12·61	7·45	13·58	23·66	25·98	11·56	4·53	24·40	32·96	9·39
10	34·40	35·74	30·37	12·32	7·38	13·72	23·68	26·14	12·68	3·48	19·90	30·73	8·35
12	33·89	35·11	29·82	11·26	7·05	13·48	24·11	26·73	13·39	2·75	17·35	29·01	7·55
Means	+35·44	+36·68	+31·05	+12·70	+ 7·73	−12·93	−22·87	−24·93	−11·54	+ 5·48	+23·02	+33·58	+ 9·63

The mean temperature of the year in the Fury, from 4380 observations (sum 42183·8) is +9.63 Fahr.

TABLE XXV.—Means of the two preceding sets of observations in the Hecla and Fury.

Hour.	1821.						1822.						Mean temp. of each hour for the year.
	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	
A.M. 2	+32·77	+34·43	+30·22	+11·71	+ 7·34	−14·00	−23·85	−25·12	−13·50	+ 2·20	+14·84	+28·19	+ 7·26
4	32·91	34·82	30·40	11·58	7·43	14·19	23·92	24·96	13·53	2·07	16·45	29·20	7·51
6	33·76	35·45	30·62	11·95	7·47	14·10	23·44	24·84	13·03	3·96	20·84	31·08	8·47
8	34·83	36·62	31·13	12·72	7·91	13·89	22·72	24·36	11·69	6·30	23·14	33·89	9·66
10	36·48	37·78	32·36	14·07	8·32	13·43	22·19	23·12	9·72	9·74	26·24	36·25	11·23
Noon.	37·21	38·56	32·96	15·06	8·70	13·58	21·77	22·02	7·73	11·48	29·11	38·33	12·36
P.M. 2	37·95	39·16	32·99	15·34	8·58	13·90	22·08	21·81	6·98	11·38	30·11	37·89	12·55
4	37·70	38·89	32·99	14·59	8·49	14·40	22·76	22·65	7·74	10·19	29·84	36·92	12·01
6	36·83	38·05	32·43	13·98	7·98	14·59	23·39	23·95	9·67	8·23	27·27	34·81	10·84
8	35·78	36·89	31·86	13·28	7·73	14·8[illegible]	23·76	24·85	11·07	5·40	24·15	31·97	9·58
10	34·43	36·15	30·99	12·75	7·46	15·03	23·87	24·98	11·65	3·72	19·77	30·36	8·51
12	33·68	35·51	30·38	11·91	7·17	15·01	24·27	25·30	12·36	3·14	17·60	29·17	7·80
Means	+35·36	+36·86	+31·61	+13·25	+ 7·88	−14·24	−23·17	−23·99	−10·72	+ 6·48	+23·29	+33·17	+ 9·81

The mean temperature of the year by this Table, from 8760 observations in Hecla and Fury (sum 85960·5) is +9·81.

Note.—Plate i., fig. 4, is projected from Table XXV., its last column being used also in the construction of Plate ii., fig. 7.

TABLE XXVI.—Showing the mean temp. for each alternate hour of the four seasons of the year 1821-22, at Winter Island, lat. 66° 11′ N. deduced from two sets of observations on board the Hecla and Fury, 4380 observations in each set.

Hours.	Autumn; Sep. Oct. Nov.	Winter; Dec. Jan. Feb.	Spring; March, April, May.	Summer; June, July, Aug.
	°	°	°	°
A.M. 2	+16·37	—20·85	+ 1·17	+31·83
4	16·42	20·89	1·66	32·35
6	16·63	20·66	3·92	33·46
8	17·20	20.19	5·91	35·13
10	18·20	19·46	8·62	36·85
Noon	18·86	19·01	10·94	38·03
2	18·93	19·18	11·50	38·33
4	18·65	19·81	10·77	37·85
6	18·09	20·51	8·73	36·58
8	17·59	21·03	6·17	34·91
10	17·02	21·17	3·95	33·68
12	16·44	21·40	2·79	32·82
Means.	+17·53	—20·35	+ 6·35	+35·15

TABLE XXVII.—Showing the mean temp. for each alternate hour for six summer and winter months, deduced from the same two sets of observations as the preceding table.

Hours.	Winter; Sep. to Feb. incl.	Summer; March to Aug. inclusive.
	°	°
A.M. 2	— 2·14	+16·49
4	— 2·14	17·00
6	— 1·91	18·69
8	— 1·39	20·52
10	— 0·52	22·80
Noon	+ 0·03	24·49
2	— 0·02	24·92
4	— 0·49	24·31
6	— 1·12	22·60
8	— 1·61	20·54
10	— 1·97	18·82
12	— 2·35	17·81
Means.	— 1·30	+20·75

NOTE.—Plate ii. fig. 4, is projected from table xxvi., and table xxvii. is used in the construction of plate ii. fig. 6.

TABLE XXVIII.—Containing the highest and lowest temperatures of each month, the means of the daily maxima and minima, separately and combined for the several months and the whole year, extracted from the Fury's register kept at Winter Island in 1821-22.

Month.	Highest temp. in the month.	Lowest temp. in the month.	Means		
			of Maxima.	of Minima.	of Extremes.
	°	°	°	°	°
July .	+ 50·0	+ 29·0	+ 39·71	+ 32·27	+ 36·00
Aug. .	+ 48·0	+ 28·0	+ 40·81	+ 33·24	+ 37·02
Sep. .	+ 42·0	+ 20·0	+ 33·73	+ 28·10	+ 30·92
Oct. .	+ 32·5	+ 13·0	+ 17·03	+ 7·15	+ 12 09
Nov. .	+ 28·0	— 20·0	+ 12·08	+ 2·92	+ 7·50
Dec. .	+ 2·0	— 29·0	— 9·16	— 16·74	— 12·96
Jan. .	— 6·0	— 37·5	— 19·13	— 27·01	— 23·16
Feb. .	— 4·0	— 37·0	— 20·04	— 30·61	— 25·32
March .	+ 13·0	— 35·0	— 5·62	— 19·05	— 12·23
April .	+ 29·0	— 12·0	+ 11·78	— 1·27	+ 5·26
May .	+ 46·0	— 5·0	+ 30·98	+ 13·23	+ 22·10
June .	+ 50·0	+ 20·0	+ 40·78	+ 27·27	+ 34·02
Means.	+ 27·55	— 5·46	+ 14·58	+ 4·30	+ 9·44

The highest temperature noted in the year occurred on 19th June, at 4 p.m. + 50·0° F. The lowest temperature occurred in January, at midnight, on the 20th, and at 2 and 4 a.m. on the 21st, and was —37·5° F.

Section V.

Observations at Fort Franklin.

Though the thermometrical observations made at this place, owing to several accidental circumstances did not extend to a complete year, and were not continued through the whole 24 hours, yet they are here inserted for the purpose of exhibiting, as far as they go, the great difference there is, even in the high latitudes, between the climate of a place in the interior and one on the sea-coast.

Fort Franklin stands on a gravelly bank near the outlet of Great Bear Lake, a very extensive sheet of deep water,; its latitude is 65° 12′ N.; its longitude 123° 13′ W.; and its altitude above the sea was vaguely estimated at about 230 feet. The ground rises gently to the northward or behind the fort, and an arm of the lake 4 miles wide lies in front. On the shortest day the sun, by calculation, ought to have been visible 2 h. 38 m., but the effect of refraction rendered the day considerably longer. The length of day on the 9th of December measured by the chronometer, was 3 h. 55 m, being 41 m. longer than it was calculated to be. On the 20th of June the sun by calculation remains 21 h. 41 m. above the horizon, exclusive of refraction. The rising ground to the north prevented the actual length of the day from being ascertained, but the red tints of the sun never left the sky in June. On the first of October, 1825, the first snow of the season fell, and on the 7th the last rain, the ground being at that time still unfrozen on the surface. The small lakes began to be covered with ice on the 9th of October, and after the 11th the snow continued to lie on the ground. On the 6th of December, Great Bear Lake was completely frozen over. In the end of March the snow, which was 3 feet deep, began to consume visibly in the sunshine without melting, and at this time there was light enough at four in the morning to read the scale of the thermometer in the open air. On the 10th of April the temperature was 40°, and for the first time in the season a thaw was perceptible in the shade. On the 11th melting snow dropped from the eaves of the houses, and patches of ground where the snow had been thin became bare. On the 11th of May the first spring shower fell, and on the 20th of the same month, the small rivers broke up, and snow was to be seen only in sheltered places, where it had drifted into wreaths in the winter. The mean temperature for the ten previous days was +37·5° Fahr. On the 8th of June a small lake about a mile across and 2 fathoms deep in the middle, broke up, having been frozen over 240 days; and on the 20th of the same month the ice of Great Bear Lake was broken up and began to drift down the river. The subsoil was perpetually

frozen on the banks of the Lake, the thaw at Fort Franklin at the end of the summer penetrating only about 20 inches.*

A spirit thermometer, hung on the north side of an observatory built of rough deal, was used for ascertaining the temperature from the commencement of the register till the end of May. After this time the sun rose and set so far to the northward, that it was difficult to find a situation for the thermometer free from the effects of radiation, and the following contrivance was therefore resorted to: the bulb and lower part of the scale of a mercurial thermometer were inclosed in two concentric cylinders, the inner one of brass, the outer one of tinned iron, but giving free admission to the air. This thermometer so protected, even when fully exposed to the sun, indicated as low, and frequently a lower temperature, than one hung up in the most shady place that could be found. The temperatures were ascertained by it for the remainder of the year. From the beginning of September till the end of May, the temperatures were carefully registered at four in the morning and at seven, and every succeeding hour till midnight. An occasional observation was also recorded at one A. M. In the spring an observation was also made at sunrise; the remaining hours were interpolated daily to give the true mean temperatures of the day and month. The time of observation was regulated by a chronometer, marking mean time. The observations for June were lost, and in July and August, the rest of the party being on the sea-coast, Mr. Dease registered the temperatures every three hours. Having lent his watch to the absent party, he could ascertain the time only by the position of the sun and a meridional line which had been traced to assist him. A second series of observations were made at the same place for nine months in the following year, when the temperatures were recorded every three hours; the results of this register are given in tables XXX. and XXXIV. By assuming + 48° as the mean temperature of June, and completing both registers by the addition of the same three summer months, the means of the two years do not differ more than a quarter of a degree, and the mean temperatures of the seasons, as appended to table XXXII., differ less than usual in two different years in the arctic regions. The springs of the two years coincide least, and these differ only 3½°. It is very probable, therefore, that notwithstanding the unavoidable imperfections of the register, the mean temperature of + 17° or 18° assigned to Fort Franklin, is very near the truth. The curves of the different seasons are beautifully regular, as may be seen in Plate ii. fig. v.

* As Great Bear Lake maintains its level all the winter, though there is a constant discharge of water by the river, and the superficial supplies are cut off by frost, it is evident that the chief source of the water must come from the bottom of the lake at a greater depth than the frozen soil descends to. Now, taking the mean temperature at + 17°, this depth cannot be less than 400 feet.

TABLE XXIX.—Containing the daily and monthly mean temperature for one year (1825-26) deduced from observations made 19 times a-day for 9 months, and 8 times for July and August, at Fort Franklin, in Lat. 65° 12′ N

Day.	1825.				1826.							
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.
	°	°	°	°	°	°	°	°	°	°	°	°
1	+39·82	+32·10	+27·04	+13·78	−43·60	−25·65	− 0·17	− 2·88	+24·25		+53·75	+47·96
2	36·79	28·90	+11·15	+10·23	−43·03	−10·25	− 8·02	− 1·42	23·08		57·67	45·37
3	39·48	31·44	+ 2·39	+17·61	−20·89	15·13	−19·24	+ 4·51	10·45		50·01	49·40
4	41·42	31·36	− 2·75	+12·01	−23·21	−21·35	−21·13	− 1·86	14·00		57·31	51·63
5	45·04	31·22	−15·73	− 6·75	−26·65	−27·54	−14·37	0·00	31·15		52·56	55·90
6	44·07	35·13	− 1·72	−14·35	−33·04	−23·56	− 2·07	− 8·42	37·79		43·87	56·41
7	38·32	35·0[illegible]	+ 3·18	−20·41	−27·32	−18·60	+22·62	−11·11	36·88		44·00	53·04
8	47·41	26·02	+ 5·71	−24·71	−17·74	−28·18	+ 1·53	+ 1·38	31·85		46·81	56·19
9	45·92	23·95	− 8·17	−36·21	−26·37	−20·80	− 3·29	+19·23	30·20		41·87	61·95
10	46·83	21·80	+ 8·14	−21·98	−35·36	−18·16	+ 5·84	+28·10	32·71		41·81	62·2
11	49·22	23·71	+ 1·94	− 9·56	−27·32	−23·13	−15·39	+28·38	34·00		51·59	61·47
12	43·15	24·00	− 6·40	− 8·32	−32·80	−29·51	−30·10	+18·98	35·62		52·88	51·1[illegible]
13	43·92	25·21	− 8·99	− 6·5[illegible]	−15·58	+ 5·04	−32·39	+14·12	38·12		53·56	50·11
14	44·53	24·01	−10·46	− 2·31	−15·05	+ 5·71	−21·62	+22·09	39·72		55·46	51·10
15	42·68	26·76	− 1·96	− 3·70	−11·27	+22·52	−22·40	+21·45	35·87		54·10	51·[illegible]
16	42·71	21·53	+ 1·08	− 7·44	−10·89	+ 3·72	− 8·71	+13·85	41·87		53·06	48·75
17	44·98	11·74	+10·99	−11·93	−15·33	− 9·73	− 5·55	+14·64	43·50		54·50	44·00
18	48·01	9·53	+11·42	−19·22	−32·90	− 7·32	−22·75	+29·20	35·97		52·77	44·37
19	45·45	9·31	+ 7·19	− 5·47	−33·52	20·24	− 9·42	+29·87	36·17		53·00	48·40
20	47·59	18·28	+ 6·16	− 8·20	−24·72	−19·76	−11·54	+18·87	33·59		53·37	48·5[illegible]
21	46·74	20·02	+ 5·07	−15·32	−18·45	−21·61	−13·76	+18·46	36·90		51·29	45·09
22	43·13	18·08	+ 4·30	−20·21	− 6·52	−19·79	+ 3·26	+12·65	39·53		50·15	43·61
23	40·49	18·20	+ 5·54	−33·91	− 7·82	−14·12	−16·69	+24·61	38·64		51·97	47·45
24	44·59	17·11	+ 9·48	−40·97	+ 2·54	+ 8·01	−16·28	+27·74	41·32		53·69	49·04
25	43·90	17·59	+ 4·64	−43·98	− 0·30	+11·60	− 8·73	+27·37	43·43		56·64	52·53
26	41·19	8·27	− 6·11	−37·95	−26·60	− 3·60	− 4·99	+27·39	46·91		61·50	49·81
27	40·39	−10·66	− 8·74	−21·85	−42·97	−15·81	+ 0·51	+20·47	47·91		60·56	49·84
28	36·39	− 1·47	6·29	−26·73	−37·69	−17·96	+ 6·48	+16·24	44·70		59·84	46·50
29	36·53	+10·55	+12·11	−12·86	−27·13	..	+ 3·40	+19·44	49·65		50·81	54·50
30	36·79	16·48	+23·65	− 9·71	−20·59	..	+ 0·20	+22·78	43·10		45·77	53·54
31	..	23·23	..	−17·81	−31·84	..	+ 9·09	..	47·32	*	45·85	50·56
Means	+42·92	+20·27	+ 2·79	−14·35	−23·78	−12·70	− 8·27	+15·20	+36·33	+48·02	+52·10	+50·56

TABLE XXX.—Results of a register kept at the same place every three hours, for part of 1826-27.

Means	+39·08	+24·67	− 3·01	− 7·42	−20·89	−20·80	− 2·50	+ 9·50	+34·02			

Mean temperature of the autumn months, viz. Sept. Oct. Nov.	. .	+ 21·97 F.
" " winter months, viz. Dec. Jan. Feb.	. . . . .	− 17·08 F.
" " spring months, viz. March, April, May	. . .	+ 14·42 F.
" " summer months, June, July, Aug. (imperfectly ascert.)		+ 50·41 F.
Mean temperature of the whole year 1825–6, about	. . . . .	+ 17·61 F.
" " of the year 1826–7. (Taking in three months, June, July, and August, of former year)	. . .	+ 17·89 F.
Mean temperature of 10 days about the winter solstice, 16–25th Dec. inclusive, 1825–26	. . . . . .	− 14·79 F.
" " "	1826—27	− 26·77 F.

* The register for June having been lost in a scuffle with the Esquimaux, cannot be supplied; but the mean assumed is not far from the truth. By including June, July, and August in the observations for 1826—27, the mean for the year as above stated is very near that of the preceding year. In both cases the mean of the year is deduced from the gross sum of the temperatures, not from the means of the months.

TABLE XXXI.—Containing the mean temperatures of 21 hours for 9 months, and of 8 hours for 2 months, from observations made at Fort Franklin in Great Bear Lake, in the year 1825-26, lat. 65° 12′ N.:—

Hour.	1825.				1826.								Mean of nine months.
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	
A.M. 1													
2											+44·71	+45·61	
3													
4	+42·36	+17·48	+1·45	−15·17	−25·21	−14·46	−15·50	+7·26	+30·51				+3·23
5	42·08	17·21	1·38	15·16	25·43	14·54	16·19	7·72	31·80		49·65	48·68	3·32
6	41·89	17·05	1·29	15·11	25·44	14·80	15·47	9·28	33·37				3·76
7	41·67	18·17	1·21	15·15	25·25	14·95	13·82	12·31	35·51				4·47
8	41·72	19·01	1·23	15·07	25·05	14·85	11·11	14·32	36·50		54·57	51·77	5·26
9	42·14	20·03	1·93	15·07	25·37	13·70	6·95	17·01	38·11				6·53
10	43·24	21·26	2·54	14·73	24·52	11·14	3·38	19·50	39·02				8·04
11	43·66	22·16	3·52	13·58	23·39	9·20	1·70	21·10	40·47		57·66	56·83	9·28
Noon 12	44·10	22·92	4·30	12·51	21·88	8·33	0·03	21·70	41·43				10·26
P.M. 1	44·61	23·58	4·83	12·05	21·48	7·72	+0·84	22·71	41·73				10·85
2	44·82	23·75	4·81	12·07	21·53	8·24	+1·71	23·21	41·65		59·02	56·88	10·96
3	44·13	23·69	4·66	12·96	21·89	9·35	+1·46	22·88	41·62				10·54
4	43·27	23·10	4·18	13·41	22·55	10·93	−0·16	21·97	41·17				9·70
5	42·92	22·39	3·63	13·40	22·56	12·59	2·89	20·18	40·65		54·69	52·66	8·82
6	42·71	21·48	3·17	14·04	22·56	13·06	5·80	18·87	39·47				7·88
7	42·64	20·58	2·84	14·11	22·55	13·21	8·44	16·42	38·20				7·00
8	42·64	20·16	3·05	14·49	23·44	13·57	9·92	14·85	36·80		50·66	48·89	6·29
9	42·39	19·75	2·95	14·74	24·66	14·02	10·84	13·32	34·65				5·55
10	42·71	19.42	2·82	14·95	23·95	14·11	11·30	12·29	33·68				5·24
11	42·72	19·16	2·77	15·75	23·95	14·24	12·58	11·32	32·57		45·81	46·95	4·72
12	42·64	18·35	2·46	16·44	24·25	13·72	13·53	10·33	31·58				4·29
Means	+42·92	+20.27	+2·79	−14·35	−23·77	−12·70	− 8·27	−15·20	+36·33	+48·02	+52·10	+51·03	+6.55

In calculating the means of the months the hours left blank were interpolated as well as 5 and 6 a.m.

NOTE.—Plate i., fig. v., was projected from table xxxi.

Table XXXII.—Showing the mean temperature of each hour of the autumn, winter, and spring seasons of three months, and of the winter half of the year, from September to February, both inclusive, at Fort Franklin, Great Bear Lake, in 1825-6:

Hour.	Autumn. *Sept. Oct. Nov.*	Winter. *Dec. Jan. Feb.*	Spring. *March, April, May.*	Six Winter Months, including *Sept.—Feb.*
A.M. 1				
2				
3				
4	+20·39	−18·41	+ 7·43	+1·10
5	20·19	18·50	7·97	0·95
6	20·25	18·57	9·29	0·94
7	20·32	18·57	11·32	0·99
8	20·63	18·41	13·29	1·20
9	21·35	18·19	16·05	1·69
10	22·34	16·99	18·36	2·79
11	23·11	15·60	19·94	3·86
Noon.	23·80	14·44	21·03	4·78
1	24·34	13·94	21·75	5·30
2	24·45	14·14	22·18	5·26
3	24·15	14·91	21·98	4·73
4	23·51	15·79	20·98	3·97
5	22·98	16·30	19·40	3·45
6	22·44	16·67	17·50	3·00
7	22·01	16·74	15·38	2·74
8	21·93	17·29	13·90	2·43
9	21·67	17·73	12·37	2·08
10	21·63	17·79	11·55	2·03
11	21·53	18·10	10·42	1·82
12	21·29	18·29	9·55	1·61
Means	+21·97	+17·08	+14·42	+2·55

The three hours left blank in the Table were interpolated to give the correct means of the seasons, contained in the bottom line.

Results of observations made every three hours in 1826—27:—

Means.	+20·33	+16·92	+10·96	+ 1·81

Note.—Plate ii., fig. 5, was projected from Table XXXII., its last column being used in a construction of Plate ii., fig. 6.

TABLE XXXIII.—Containing the highest and lowest temperature of each month, the means of the daily maxima and minima for the several months, and the means of these or of the extremes at Fort Franklin, in 1825-6.

Month.	Highest Temp. in the Month.	Lowest Temp. in the Month.	Means		
			of Maxima.	of Minima.	of Extremes.
1825.	°	°	°	°	°
Sept.	+60·5	+30·0	+48·12	+38·08	+43·10
Oct.	40·3	−18·0	+24·80	+14·82	+19.72
Nov.	32·5	−22·0	+ 8·39	− 3 72	+ 2·33
Dec.	27·5	−47·5	− 8·13	−21·63	−14·91
1826.					
Jan.	11·8	−49·0	−16·17	−31·25	−23·71
Feb.	27·8	−39·0	− 5·31	−21·71	−13·51
March	31·8	−43·0	+ 3·87	−22·01	− 9·07
April	41·6	−19·7	+24·83	+ 3·99	+14·41
May	61·0	+ 1·0	+43·89	+27·47	+35·68
June					
July	80·0	+34 0	+60·24	+42·64	+51·44
Aug.	74·0	+33·5	+58·21	+42·98	+50·60
Means of 9 months	+37·20	−23·02	+13·80	− 1·77	+ 6·00

TABLE XXXIV.—Containing similar results with the last Table, from a register kept at the same place every three hours, for part of the year 1826-27.

Month.	Highest Temp. in the Month.	Lowest Temp. in the Month.	Means		
			of Maxima.	of Minima.	of Extremes.
1826.	°	°	°	°	°
Sept.	+66·5	+ 5·0	+46·97	+31·20	+39·08
Oct.	47·0	0·0	+28·36	+21·67	+25·01
Nov.	20·5	−30·5	+ 0·26	−11·07	− 5·40
Dec.	22·5	−46·5	− 5·64	−15·03	−10·33
1827.					
Jan.	9·5	−52·0	−19·18	−29·51	−24·34
Feb.	21·0	−58·0	−17·16	−30·56	−24·14
March	21·0	−32·2	+ 3·51	−11·16	− 3·82
April	49·0	−26·0	+17·66	+ 2·83	+10·24
May	69·0	+ 4·0	+42·35	+25·68	+34·02
Means of 9 months	+36·22	−26·24	+10·79	− 1·77	+ 4·18

The highest temperature, excluding the month of June, occurred on the 12th of July, 1826 . . . . . . +80·0 Fahr.

The lowest temperature in 1825-6 was on 1st January, 1826 . −49·0 Fahr.

,, in 1826-7 was on 7th February, 1827 . . −58·0 Fahr.

On the 5th, 6th, 7th, and 8th of February, the thermometer never rose above . . . . −40·0 Fahr.

SECTION VI.

On the Daily Progression of Temperature, or the Form and Character of the Annual and Monthly Daily Curve, at the several Places of Observation.

THE daily curves for the several years (1819-20. 1821-22, 1822-23, and 1824-25) at the respective places of observation in different parallels of latitude, are projected in Plate III., fig. 2, each point of the curve being the result of at least 365 or 366 observations; and where two sets of observations are conjoined, as at Winter Island and Igloolik, of double that number. The curves of mean temperature in these several parallels are so similar, that the few remarks that we have to make may be conveniently conjoined. In all except at Port Bowen, the temperature is lowest at 2 o'clock in the morning; it then increases till 2 in the afternoon, when it descends regularly till it reaches the minimum again. At Port Bowen the ascending and descending portions of the curve also occupy equal times, but the hours of observation being different, the minimum occurs at 1 A.M. and 1 P.M. respectively. Had the temperatures been recorded every hour or oftener, the times at which the maximum and minimum occur would have been ascertained more exactly, but it does not follow that the proportions between the ascending and descending branches of the curve would have been changed. At Leith the minimum occurs between 4 and 5 in the morning, and the maximum at 3 in the afternoon, the period of the ascent being 9 hours, 40 min., and of the descent 14 hours, 20 min., or nearly in the ratio of 2 : 3. While at Plymouth the temperature ascends for 8 hours, from 5 A.M. to 1 P.M., and descends 16, or in the ratio of 1 : 2. An increase of latitude, though (as far as we can judge from a few examples) it renders the branches of the curve more nearly of equal length, does not appear within certain limits to alter the hour of the minimum, that being 5 A.M. at both Leith and Plymouth, which are 6° of latitude apart, while at Winter Island and Melville Island, which are 8½° apart, the minimum at both is at 2 A.M.

The daily curves for the months are projected in Plate I., and the curves for the seasons of 3 months each, in Plate II. Plate III., fig. 1, exhibits the curves of the summer and winter halves of the year. On examining these plates we observe the flatness of the curves of the winter months, and at places where the sun is absent for many days about the winter solstice, their irregularity. The autumn curves are nearly as flat as the winter ones, and the spring curves are the sharpest and boldest of all. The first spring month, March, has the morning and evening parts of its

curve running in the horizontal and irregular manner of a winter curve, while its meridian portion rises rapidly from 6 in the morning till 2 in the afternoon, descending again till about 8 P.M. The other two spring months have the elevated part of their curves successively wider in proportion to their nearness to the summer solstice, so that they would include each other and be included by the summer curves which are fuller and broader. June retains more of the spring form than the other two summer months. The change from the full broad August curve to the flattish and often irregular September one is abrupt. The smallness of the mean hourly range of the autumn months is very striking when contrasted with the spring months, whose curves show that the mornings are cold and the mid-days hot. The daily range spoken of in Section IX. has no direct relation to the hourly curve for a month or longer time,—the mean daily range being often great in the autumn and winter months.

Sir David Brewster, in commenting on the Leith observations remarks that they form three groups. 1. The *curves of high temperature* being those of June, July, August, and September; the *curves of low temperature* being those of November, December, January, February, and March; and the *curves of moderate temperature* those of April, May, and October. In the projections of the arctic curves of temperature, there is no such distinct grouping marked by intervening free space. The three summer months are indeed clustered at one end of the scale, and the winter ones at the other, but the autumn and spring months generally alternating with each other, fill up the vacancy between them, and even cut both groups. Of the two equinoctial months, September and March, the former lies near or among the summer curves, and the latter has the same relation to the winter groups; its lowest limbs cutting them, or sometimes, as at Port Bowen, descending below the whole group. October in most cases is immediately above the mean annual curve, and April just below it, there being an exception in the case of Melville Island, where the October curve lies below the line of mean temperature. The curve for November has a more uncertain position, being sometimes mingled with the winter group, and at other times so high as to cut the mean annual curve. May (which in this point of view, that is its connexion with the sun's declination, pairs with November) has its curve running more uniformly about midway between the mean temperature and the summer group.

In the Tables from which Plate II., fig. 6, was projected, I have included September with the winter months and March among the summer ones (contrary to what Sir David Brewster and Mr. Snow Harris have done), their types in the arctic regions requiring this arrangement. Even at Leith and Plymouth, the March curve has

much of the spring character, though September at these places departs less from the summer type than in the higher latitudes of North America. On consulting Plate ii., fig. 6, the very great difference between the mean summer and winter temperatures of places situated within the arctic circle, becomes apparent; and these curves would have been still more widely separated had September been added to the summer months and March to the winter ones. These cold winters and warm summers are the chief characteristics of a severe or continental climate. At Leith and Plymouth, which have a purely maritime climate, these curves stand much nearer to each other in the scale of temperature.

Section VII.

On the Determination of the two times of the Day when the Mean Temperature occurs.

As the curve of daily temperature on the average of a month or longer period, has been shown by the tables and plates referred to in the preceding section, to rise in a regular manner from a minimum occurring at some hour in the morning, to a maximum at or after noon, and from thence to descend until it reaches the minimum again, it is evident that it must cut the horizontal line of the mean heat twice, once in the morning and once in the evening, the only exception being in the winter months of the high latitudes, when, during the absence of the sun, the curve of temperature occasionally departs from this regular course. No such irregularity, however, is observed in the curve for the whole year, and the determination of the exact times of mean temperature for that period is of much importance. When correctly ascertained we are furnished with the two best times of the day for recording the indications of thermometers; and even from one observation daily, continued for a year, the same result may be obtained as from 24 observations every day. Sir David Brewster remarks that at Leith the ascending or morning branch is more regular in its progression than the descending or evening branch, and that on this account, a single observation made every day at the time of the morning mean, is to be preferred to a single observation made every day at the time of the evening mean. Tables xxxv. and xxxvi. show the time of the mean temperature for the months, seasons, half-year, and whole year, at various places, the times for Leith and Plymouth being added from the papers of Sir David Brewster and Mr. Snow Harris.

Not being competent to discuss a question involving an acquaintance with the higher branches of mathematics, my object in the

few remarks that I think necessary to make is, merely to point out the more obvious results of the tables constructed from actual observations, and not to base upon them any reasoning upon the general distribution of heat upon the earth's surface; but it may assist the general reader to have placed before him a quotation or two on the subject from eminent authorities. Sir John Herschel states that "the temperature of any part of the earth's surface depends mainly, if not entirely, on its exposure to the sun's rays. Whenever the sun is above the horizon of any place, that place is receiving heat; when below, parting with it, by the process called radiation; and the whole quantities received and parted with in the year, must balance each other at every station, or the equilibrium of temperature would not be supported." * We learn also from the popular treatises on astronomy that, as the whole duration of daylight, or at least the amount of time in which the sun is above the horizon throughout the year,† is very nearly the same at every place on the earth's surface, the difference of the heating effect of his rays in different parallels of latitude must be due to the difference of his average elevation at these places, and must consequently decrease in approaching the poles. And, again, in reference to summer heat alone, though the length of the day increases with the latitude, the altitude of the sun causes fewer rays to strike the earth's surface;‡ but it has not yet been ascertained in what degree these opposite tendencies counteract each other.

The results of calculation are not, however, of themselves sufficient to indicate the climate of any place, experience having shown that the mean heat of different places on the same parallel of latitude is very various. And it is by observation alone that we can determine the effect of local causes, such as the absolute elevation of the country above the sea-level, the neighbourhood of lofty ranges of mountains, the extent of continent with which it is connected, its position, whether near the eastern or western shores of that continent, the existence of large lakes in its vicinity, the geological constitution of the soil, its drainage, and the average moisture of the atmosphere, &c. One object which I had particularly in view in undertaking to discuss the arctic observations was, to elicit the differences between a severe or con-

* Treatise on Astronomy, p. 196.—Soc. for Diff. of Useful Knowledge.

"As the intense heat supposed to exist in the centre of the earth might be thought capable of influencing the surface, it may be sufficient to say that M. Fourier, in a paper written to demonstrate the existence of this interior heat, informs us that it may be proved from the laws of refrigeration that at the present time the effect of central heat in raising the temperature of the surface above the value, which the action of the sun alone would give it, has become almost insensible."—*Ed. Phil. Jour.* xiv. p. 117.

† The effect of refraction in the high latitudes is mentioned in the following page.

‡ Astronomy, by the Society for the Diffusion of Useful Knowledge, p. 28.

tinental climate, and that of the maritime stations of Leith and Plymouth.

A circumstance particularly affecting the arctic observations, and especially in the spring, must not be left unnoticed, viz., *refraction.* The effect of this in accelerating the appearance of the sun and retarding his disappearance, has never been overlooked, but the full amount of it at very low temperatures has scarcely been generally acknowledged. Mr. Fisher informs us that at − 28° Fahr. he found the horizontal refraction to be 2° 30′, or with the addition of the apparent dip, nearly three degrees. At 58° or 60° Fahr. the refraction must have been very much greater. The mean temperature of several of the winter months at Sir Edward Parry's different wintering places is as low as that of the day on which Mr. Fisher observed as above quoted; and Barentz, who wintered in latitude 76° N., saw the sun when it required more than 4½° of refraction to render it visible. At Melville Island, the period of the sun's absence at the winter solstice was actually shortened nearly a fortnight by refraction.

At Fort Franklin, the vicinity of so large and deep a body of water as Great Bear Lake must influence the mean heat in two ways. Notwithstanding the general fact quoted from M. Fourier, (in p. 33) the constant supply of water from a stratum low enough to be influenced by the central heat of the earth must affect the temperature of the neighbourhood, particularly in the autumn and beginning of winter. This great lake was not frozen across till nearly two months after the shallower pieces of water near it were set fast. In summer again, when the ice on the lake, then nearly six feet thick, was broken up, it was carried off by the current into Mackenzie River, without contributing by its dissolution to lower the summer temperature of the place where it was generated, though the autumnal cold must have been tempered in a certain degree, however small, by the heat necessarily set free as the water passed from a fluid to a solid state.

Most travellers into the arctic regions concur in fixing the time of the greatest cold at sunrise or shortly before it; and there is reason to believe that this opinion is substantially correct in the spring months; but further observation is wanted to establish it as a general rule in the other seasons. Reasoning on theoretical grounds, we might be led to conclude that the rule is true wherever the sun sets; for the terrestrial radiation going on during the absence of that luminary must tend continually to lower the temperature. But the amount of radiation is greatly influenced by the clearness of the sky; and it was often remarked at Fort Enterprise, that a clear sky soon after sunset was accompanied by a brilliant *aurora borealis,* and that this seldom continued beyond midnight or one in the morning, when it was superseded by fleecy

clouds obscuring the blue sky. It often happened that shortly before sunrise the sky again cleared, and it was almost always much colder to the sensations at that time than at any other hour of the night. It would be interesting to ascertain whether, when the sun does not set, the temperature be lowest soon after midnight. Sir Edward Parry's observations are not sufficiently frequent to determine this point. At Melville Island and Igloolik, the temperature is lower at 2 A.M. than at midnight, and at Port Bowen at 1 A.M. than at 11 P.M., during the summer months. Another point necessary to mention is, the very great clearness of the atmosphere in the high latitudes of North America, contrary to the popular notion which envelopes all these countries in perpetual fogs. We found this to be the case during four winters spent in the interior, and Sir Edward Parry has borne testimony to the same effect on the coast. Fogs are prevalent only when the ice is breaking up or drifting about.

Prefaced by these observations, table XXXV., containing the leading points of the *annual daily curve*, may be allowed to speak for itself. It will be seen that the greatest difference between the British and North American observations, is in the length of the interval between the minimum and morning mean, or in other words, the rapidity of the morning ascent of temperature, the rise being more rapid in the lower latitudes. The length of the interval between the evening mean and minimum is affected in the opposite way, though rather less regularly by a decrease of latitude. The intervals between the morning and evening times of mean temperature are much more nearly equal—their lengths at Melville Island and Plymouth, lying 24° of latitude apart, differing only about one-eleventh, while the intervals contained in the two last columns of the table, being those mentioned above, vary one-half of their amount.

TABLE XXXV.—Showing the critical points of the daily curve of temperature at various places.

Place.		Time of				Interval between				
Name.	Lat.	Minimum temp.	Morning mean temp.	Maximum temp.	Evening mean temp.	Minimum and following Maximum.	Maximum and following Minimum.	Morning and evening mean.	Minimum and morning mean.	Evening mean and Minimum.
	° ′	A.M. h. m.	A.M. h. m.	P.M. h. m.	P.M. h. m.	h. m.	h. m	h. m.	h. m.	h. m
Melville I.	74 12	2 00	8 41	2 00	8 27	12 00	12 00	11 46	6 41	5 33
Port Bowen	73 14	1 00	7 27	1 00	6 50	12 00	12 00	11 23	6 27	6 10
Igloolik .	69 20	2 00	8 10	2 00	7 25	12 00	12 00	11 15	6 10	6 35
Winter I. .	66 11	2 00	8 11¼	2 00	7 36	12 00	12 00	11 24½	6 11¼	6 24
Leith . .	55 56	5 00	9 13	2 40	8 27	9 40	14 20	11 14	4 13	[illegible] 33
Plymouth	50 21	5 00	8 09	1 00	7 00	8 00	16 00	10 51	3 09	10 00

As Table XXXV. applies to the mean results of a whole year, and not to a less period of time, the hours of mean temperatures are given for the months in Table XXXVI., and for the seasons of three and six months in Table XXXVII. The effect of declination in producing a variation of the hours can be clearly traced on comparing one month with another of the same year, though less regularly, from the various causes already enumerated in the high latitudes, than at Leith or Plymouth; but even at the latter places the gradation does not appear to be perfect. Greater accuracy would most probably be obtained were the observations made by apparent time instead of mean time. When the equation is considerable and the apparent time is earlier than the mean, the effect of registering by the latter is the same as an increase of declination, and *vice versâ*. To render the investigation of Tables XXXVI. and XXXVII. more easy, the intervals, as calculated from them, are given in Tables XXXVIII. and XXXIX.

Table XXXVI.—Showing the hours of morning and evening when the mean monthly temperature occurs:

Place.	Lat.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.
		A. M.											
	° ′	h. m	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m
Melville Island	74 12	9 01	8 42	6 37	9 49	..	8 54	8 46	8 37	9 7	7 59	7 43	7 42
Port Bowen .	73 14	8 03	7 38	2 58	0 29	8 08	5 20	7 57	7 30	7 00	6 26	7 31	8 28
Igloolik . .	69 20	7 51	8 28	..	8 23	9 14	9 8	8 52	8 27	8 00	7 34	7 09	8 19
Winter Island.	66 11	8 47	8 47	7 31	1 31	6 45	8 36	8 59	8 06	8 04	7 29	8 39	8 25
Fort Franklin.	65 12	9 37	9 12	10 15	10 20	10 40	9 23	8 41	8 20	7 50	..	..	..
Leith . . .	55 58	8 52	9 25	9 39	9 56	10 34	10 02	10 10	9 01	9 14	9 07	8 55	9 00
Plymouth	50 21	8 09	8 23	8 54	9 14	9 22	9 23	8 36	7 52	7 39	7 50	7 21	7 51
		P. M.											
	° ′	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
Melville Island	74 12	10 13	5 51	10 15	..	5 59	5 59	7 45	8 7	9 3	8 25	8 17	7 16
Port Bowen .	73 14	7 15	7 13	5 17	0 49	7 40	5 04	6 07	6 56	7 16	7 08	6 51	8 23
Igloolik . .	69 20	7 18	6 35	4 23	4 00	5 47	6 03	7 19	7 49	7 50	8 24	7 15	7 34
Winter Island.	66 11	8 31	8 07	6 48	3 21	5 18	6 05	7 30	7 14	8 23	7 09	8 37	8 05
Fort Franklin.	65 12	5 00	7 44	10 36	7 38	5 33	5 14	6 56	7 47	8 13	..	..	..
Leith . . .	55 58	8 18	6 48	7 41	6 15	6 57	6 56	8 08	8 26	8 40	8 24	8 40	8 19
Plymouth . .	50 21	6 28	6 15	7 20	5 20	7 16	6 39	6 58	6 47	7 25	7 21	7 25	7 23

TABLE XXXVII.—Showing the hours of morning and evening when the mean temperature of four quarters of the year, of the summer and winter halves, and of the whole year, occurs.

Place.	Lat.	Autumn 3 Mo.	Winter 3 Mo.	Spring 3 Mo.	Summer 3 Mo.	Winter 6 Mo.	Summer 6 Mo.	Whole Year.
		A. M.						
	° ′	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
Melville Island	74 12	8 46	9 40	8 50	7 43	9 12	8 35	8 41
Port Bowen .	73 14	8 39	3 00	7 30	7 01	7 35	7 26	7 27
Igloolik . .	69 20	7 34	8 56	8 27	7 30	8 12	8 07	8 10
Winter Island.	66 11	8 40	7 23	8 19	8 01	8 12	8 12	8 12
Fort Franklin.	65 12	9 33	9 55	8 24	7 12?	9 47	8 01?	8 54?
Leith . . .	55 58	..	..	..	..	9 57	9 01¼	9 13
Plymouth . .	50 21	8 26	9 18	8 01	7 33	8 50	7 48	8 09
		P. M.						
	° ′	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
Melville Island	74 12	8 40	10 24	8 26	8 09	10 04	8 13	8 27
Port Bowen .	73 14	2 20	4 18	6 42	7 23	6 24	6 45	6 50
Igloolik . .	69 20	5 48	5 46	7 41	7 59	5 47	7 42	7 25
Winter Island.	66 11	8 13	5 27	7 52	7 43	6 44	7 48	7 36
Fort Franklin.	65 12	7 30	7 26	7 39	7 12?	7 37	7 34?	7 35?
Leith . . .	55 58	..	..	..	..	7 09	8 28	8 27
Plymouth . .	50 21	6 25	6 30	7 01	7 21	7 09	6 37	7 00

TABLE XXXVIII.—Showing the length of the interval between the morning and evening hours of mean temperature for each month of the year, deduced from table xxxvi.:—

Place.	Length of Shortest Day.	Length of Longest Day.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar	April	May.	June.	July.	Aug.
			h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
Melville Island	Sun abs. 84 days	Sun above hor. 102 days.	..	9 09	..	..	..	9 05	10 59	11 30	11 56	12 26	12 34	11 34
Port Bowen	do. 84 days	..	11 12	11 35	14 19	..	11 32	11 44	10 10	11 26	12 16	12 32	11 20	11 55
Igloolik	do. 38 days	do. 60 days	11 27	10 07	..	7 37	8 33	8 55	10 27	11 22	11 50	12 50	12 06	11 15
Winter Island	0	24 hours	11 47	11 20	11 17	..	10 33	9 29	10 41	11 08	12 19	11 40	11 58	11 40
Fort Franklin	3h. 10m.	nearly 24h.	..	10 32	..	9 18	9 53	..	10 15	11 27	12 23	..	..	..
	h. m.	h. m.												
Leith .	6 52	17 32	11 26	9 23	10 02	8 19	8 23	8 54	9 58	11 25	11 26	11 17	11 45	11 19
Plymouth	..	..	10 19	9 52	10 26	8 06	9 54	9 16	10 22	10 55	11 46	11 31	12 04	11 32

Table XXXIX.—Showing the length of the interval between the morning and evening hours of mean temperature, for four seasons, the summer and winter halves of the year, and for the whole year, deduced from table xxxvii.

Place.	Three months.				Six months.		Whole year.
	Aut.	Winter.	Spring.	Summ.	Winter.	Summ.	
	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	
Melville I.	12 00	12 00	12 00	12 00	12 00	12 00	12 00
Port Bowen	11 41	13 13	11 12	12 22	11 49	11 19	11 23
Igloolik	10 14	8 50	11 14	12 29	9 35	11 35	11 15
Winter I.	11 33	10 01	11 33	11 42	10 32	11 36	11 24
Fort Frank.	10 03	9 41	11 15	12 00	9 56	11 33	11 41
Leith					9 42	11 26	11 14
Plymouth	9 59	9 12	11 00	11 48	10 19	10 45	10 51

Section VIII.

On the Relation between the Mean Temperature of the 24 Hours and that of any Single Hour, or any similar pair of Hours.

Mr. Snow Harris found that at Plymouth the mean annual temperature of any hour of the day does not differ more than 5° from the mean annual temperature of the 24 hours; and Sir David Brewster found the differences at Leith to be 3° only. The deviation shown by the arctic observations is only 2½° or 2¾°, except at Igloolik, where it is 3½°, and in each case the excess of the maximum above the mean exceeds the defect of the minimum. Sir David Brewster states that the deviations are greater in the warmer years, which explains why its amount is less at Port Bowen than at Melville Island, the season passed at the former having been, according to Sir Edward Parry, a very ungenial one. The nearer the hours are to the times at which the daily curve crosses the mean line, the less of course is the deviation, and the more appropriate, as has been already remarked, for selection as the time for making a single daily observation throughout the year.

Table XL. is intended to show the deviations of the mean temperature of similar pairs of hours from that of the mean of the whole 24. From this table it appears that in the arctic registers the deviation of any pair of hours from the mean of the 24, is less than half a degree, and at the majority of the places of observation it does not exceed a quarter of a degree. The difference is greater at Leith, and still greater at Plymouth, being least at Melville Island, the most northerly place of observation.

Of all the similar pairs of hours, that of 4 and 4 are nearer to the average heat of the whole day at Melville Island, Winter Island, and Leith; and at Port Bowen and Plymouth, 9 and 9. The mean temperatures of the intermediate pairs as they are arranged in the table, are less than the annual mean of the 24 hours, and of the extreme ones greater at all the places of observation. The change from deficiency to excess, and the contrary, takes place twice in each column, and by considering the curves, as projected on Plate II., Fig. 7, it will be at once seen that 9 and 9 are the pair of hours which coincide most nearly with the times at which the curve crosses the line of mean temperature. The abscissa of one hour of each pair is above the mean line, and of the other below; the deviations, therefore, of the mean temperature of any pair from the mean must have a relation to variations in the form of the curve. At Igloolik, 10 and 10 approach within 100th of a degree of the mean heat, and 4 and 4 within 200ths.

Table XL.—Showing the deviation of the mean temperature of similar pairs of hours from that of the whole day, also the deviation of the annual mean of the extreme temperatures of each day from the real mean heat.

Hour.	Melville I.	Port Bowen	Igloolik.	Winter I.	Leith.	Plymouth.
1 and 1		+1·14			+0·37	+0·96
2 ,, 2	+0·12		+0·32	+0·09	+0·43	+0·63
3 ,, 3		+0·07			+0·34	+0·20
4 ,, 4	−0·01		+ 02	−0·06	+0·08	−0·33
5 ,, 5		−0·21			−0·13	−0·89
6 ,, 6	−0·12		−0·39	−0·16	−0·29	−1·11
7 ,, 7		−0·19			−0·35	−0·96
8 ,, 8	−0·13		−0·30	−0·21	−0·41	−0·66
9 ,, 9		+0·04			−0·32	−0·02
10 ,, 10	+0·17		+0·01	−0·08	−0·12	+0·40
11 ,, 11		+0·14			+0·11	+0·79
12 ,, 12	+0·17		+0·34	+0·27	+0·32	+0·99
Means of Extreme temp.	+1·64	+0·01	−0·08	−0·19		

The deviations of the means of the extreme temperatures for the whole year, from the true means, are placed underneath the columns appropriated to the arctic observations in this table, for the purpose of comparison.

Section IX.

On the average Daily Range for each Month and for the Year.

The measure of the daily change of temperature for each month, Sir David Brewster remarks, will bear some relation to the sun's declination; and the result of two years' observation at Leith showed that "it is nearly at its minimum about the winter solstice, and gradually increases till April, when it reaches its maximum; it then declines and again rises to a second maximum in July, after which it gradually diminishes till the end of the season." His results are contained in the last column of the following table. The four first columns, embracing places within or close to the arctic circle, also exhibit the greatest range in April, but the minimum is mostly in September; and though at Melville Island and Winter Island there is an increase in July, this is not the case at the two other places. The range in the arctic winters is considerable, and during the absence of the sun is most likely due to the great amount of terrestrial radiation. At Fort Franklin, on clear nights, a thermometer with a blackened bulb always marked a lower temperature than one with a clean bulb. At this place the average range is greatest in March, and there is also a rise in July. The temperatures were recorded too seldom at Fort Enterprise, Cumberland House, and Penetanguishene, to give the correct range, and the two latter places are included in the table solely for the purpose of showing how much greater the range is in the severe or continental climate of North America than in the maritime one of Leith. The observations at Fort Reliance, situated at the east end of Great Slave Lake, were made by Sir George Back, and indicate an unusually great range, particularly in the winter months.

Tables XLII. and XLIII. are appended to XLI. merely to give a fuller view of the variations of an arctic climate.

TABLE XLI.—Showing the average daily range of temperature for each month, and for the whole year, at various places :—

Month.	Lat. 74° 47′ N. Melville Island, 1819-20 ; Hecla.	Lat. 73° 14′ N. Port Bowen, 1824-5; Hecla.	Lat. 69° 20′ N. Igloolik, 1822 3; Fury.	Lat. 66° 11′ N. Winter Island, 1821-22; Fury.	Lat. 65° 12′ N. Fort Frank. 1825-6 & 1826-7.	Lat. 64° 28′ N. Fort Enterprise, 1820 21.	Lat. 62° 46′ Fort Reliance 1833-4.	Lat. 53° 57′ Cumberland House, 1819 20.	Lat. 44° 49′ Penetaguishene, 1825 26.	Lat. 55° 58′ Leith, 1824 & 1825.
	°	°	°	°	°	°	°	°	°	°
Sep. .	6·80	4·88	7·67	7·43	12 95	11·00		8·43	7·04	8·04
Oct. .	9·94	7·81	8 34	7·56	8·33	9·10		11·60	10·45	4·87
Nov. .	8·38	11·32	9·83	5·63	11·72	7·10	13·48	9·20	9·71	4·15
Dec. .	10·05	7·84	7·31	9 88	6·42	7·70	15·36	8 80	6·45	2·31
Jan. .	8·76	6·97	10 15	9·17	12·70	11·82	11 29	11·80	10·75	2·66
Feb. .	8·36	8·89	12 20	7·55	14·64	12·50	20·72	13·10	11·93	3·57
Mar. .	12·50	13·32	14·24	7·71	20·02	21·40	24·61	19·40	9 84	6·15
Apr. .	17·02	16·72	21·27	10·57	17·83	23·50	24·94	17·00	8·77	10·63
May .	14·19	13·27	16·73	13·53	16·55	22·50	19 56	18·30	17·73	8·58
June .	8·13	10·58	16·51	13·05					12·90	8·26
July .	12·25	8·10	11 32	17·76	17·60				8·50	9·67
Aug. .	7·36	6·82	7·50	13·52	16·23				10·95	7·59
Whole Year.	10·28	9·74	11·87	10·28	14·30				10·53	6·14

TABLE XLII.—Showing the extreme range of temperature in one month :—

One Month.	64.0	57·0	67·0	51 0	113·4					

TABLE XLIII.—The extreme range in one year, or difference between highest and lowest temperatures recorded :—

Year.	110·0	98·5	104·0	87·5	129·0	131·5	135·0	134·0	124·0	

Table XLIV.—Showing the mean annual temperature of every second hour, as observed and calculated on the supposition of these being abscissæ of Parabolas; and containing also their differences.

Hours.	Melville I. Lat. 74¾°			Port Bowen, Lat. 73¼°			Igloolik, Lat. 69⅓°			Winter I. Lat. 66⅓°		
	Observ. Temp.	Calcul. Temp.	Diff.	Observ. Temp.	Calcul. Temp.	Diff.	Observ. Temp.	Calcul. Temp.	Diff.	Observ. Temp.	Calcul. Temp.	Diff.
	°	°	°	°	°	°	°	°	°	°	°	°
A.M. 1				+2·404	+2·404	0·000						
2	−0·915	−0·915	0·000				+2·781	+2·781	0·000	+7·259	+7·259	0·000
3				2·568	2·589	−0·021						
4	−0·803	−0·710	+0·093				3·001	3·089	−0·088	7·513	7·522	−0·009
5				2·988	3·144	−0·156						
6	−0·113	−0·094	+0·019				3·882	4·015	−0·133	8·473	8·324	+0·019
7				4·022	4·070	−0·048						
8	+0·880	+0·933	−0·053				5·544	5·556	−0·012	9·656	9·658	−0·002
9				5·384	5·425	−0·041						
10	+2·341	+2·465	−0·125				7·610	7·611	−0·001	11·231	11·252	−0·021
11				6·266	6·264	+0·002						
12	+3·356	+3·529	−0·173				8·957	8·874	+0·073	12·360	12·264	+0·096
P.M. 1				6·550	6·550	0·000						
2	+3·884	+3·884	0·000				9·295	9·295	0·000	12·551	12·551	0·000
3				6·243	6·291	−0·048						
4	+3·537	+3·643	−0·106				8·474	8·807	−0·333	12·012	12·202	−0·190
5				5·237	5·514	−0·277						
6	+2·626	+2·920	−0·294				6·763	7·342	−0·579	10·836	11·151	−0·318
7				4·256	4·227	+0·029						
8	+1·622	+1·715	−0·093				5·275	5·218	+0·057	9·555	9·505	+0·050
9				3·367	3·214	+0·153						
10	+0·560	+0·279	+0·281				3·840	3·862	−0·022	8·509	8·257	+0·242
11				2·677	2·607	+0·070						
12	−0·439	−0·617	−0·178				3·150	3·052	+0·098	7·798	7·508	+0·290
Mean Temp.	+1·378	+1·378	0·000	+4·330	+4·330	0·000	+5·714	+5·714	0·000	9·813	9·813	0·000

The dimensions of the semi-parabolas were determined by the following measures:—

M = Maximum temp. of daily curve : m = Minimum of ditto : μ = Mean of ditto.

		Melville I.	Port Bowen	Igloolik	Winter I.
Abscissæ	1 and 2 $\mu - m$ B H	° m = 2·293 = 137·58	° m = 1·926 = 115·56	° m = 2·933 = 175·98	° m = 2·738 = 164·28
	2 and 4 M − μ G H	= 2·506 = 150·36	= 2·22 = 133·20	= 3·581 = 214·86	= 2·554 = 153·24
Ordinates	1 Time between evening μ and m A H	h. m m = 5 33 = 333	h. m m = 6 10 = 370	h. m m = 6 35 = 395	h. m m = 6 24 = 384
	2 Time between morning μ and m C H	= 6 41 = 401	= 6 27 = 387	= 6 10 = 370	= 6 11½ = 371·5
	3 Time between morning μ and M C G	= 5 19 = 319	= 5 33 = 333	= 5 50 = 350	= 5 48½ = 348·5
	4 Time between M and μ evening E G	= 6 27 = 387	= 5 50 = 350	= 5 25 = 325	= 5 36 = 336

SECTION X.

On the Parabolic Form of the Four Branches of the Mean Annual Daily Curve.

[See Table XLIV., p. 372.]

The calculations contained in Table XLIV. were made after the subjoined formulæ given by Sir David Brewster, and the values of the symbols will be found at the bottom of that table. *T* is the required temperature at the given time, and *y* the ordinate corresponding to that time.

1. The *night branch* descends from the evening mean temperature to the minimum. The formula for calculating the temperatures of this semi-parabola is

$$T = m + \frac{HB \times y^2}{HA^2}.$$

2. For the *morning branch*, which ascends from the minimum to the morning mean,—

$$T = m + \frac{HB \times y^2}{CH^2}.$$

3. For the *noon branch*, which ascends from the morning mean to the maximum,—

$$T = M - \frac{GH \times y^2}{CG^2}.$$

4. For the *afternoon branch*, which descends from the maximum to the evening mean,—

$$T = M - \frac{GH \times y^2}{EG^2}.$$

Sir David Brewster gives also other formulæ, which, with their investigations, are given at length in his paper so frequently quoted by us. Mr. Snow Harris has made similar calculations for Plymouth by the same formulæ.

Of the Leith observations Sir David remarks that the greatest difference between the calculated parabolic abscissæ and the points of the curve ascertained by observation. is a quarter of a degree of Fahrenheit, and that the differences are most perceptible in the afternoon branch of the curve between 4 and 8 hours. Mr. Snow Harris also found the difference greatest, at Plymouth in the afternoon branch, and amounting to eight-tenths of a degree, which he considers to be too great a deviation to allow that branch to be considered a semi-parabola. At the several arctic places of observation the observed points of the curve coincide more nearly

with the calculated abscissæ than either at Leith or Plymouth, the difference scarcely ever exceeding one-tenth of a degree, and sometimes falling short of one-hundredth of a degree. The variations are greater in the afternoon and evening branches, but except at Igloolik, they do not generally exceed a quarter of a degree, and even there, the greatest difference, which is at 6 P.M., is little more than half a degree. It is remarkable that the coincidence should be so great, considering the many sources of error peculiar to thermometric registers in the high latitudes.

Section XI.

Supplementary Tables.

The preceding pages contain all the information we could collect from the arctic registers of temperature, in furtherance of the objects indicated in Sir David Brewster's paper. But to give a fuller view of the climate in high latitudes a few tables are here subjoined, constructed from registers of temperature, too short and imperfect for deducing the annual daily curve, but yet interesting as far as they go.

The first table that follows contains the results of a thermometrical register kept on board the *Hecla*, in Hecla Cove, Spitzbergen, for three summer months in the year 1827, while Sir Edward Parry was absent on his memorable boat expedition. Hecla Cove is the most northerly position where a record of temperatures has been kept. Appended to the table are the results of Sir John Franklin's observations, made in the year 1818, when he commanded the *Trent*. As the ship was cruizing about the greater part of the time, it has not been thought necessary to calculate the summer daily curve, but the mean temperatures, being the result of 24 observations each day, are as correct as circumstances would admit, and are valuable as giving the summer heat at sea in very high latitudes.

Table XLVI. exhibits the results of observations made at Fort Enterprise on Sir John Franklin's first land expedition. The thermometer was often visited so as to ascertain pretty nearly the daily maximum and minimum; but the observations were not recorded sufficiently often at stated hours to serve for the projection of the daily curve.

TABLE XLV.—Results of a thermometric register for every second hour, kept on board the Hecla, at anchor in Hecla Cove, Spitzbergen, during the summer quarter of 1827 : lat. 79° 55′ N., long. 16° 49′ E.

Hour.	June.	July.	Aug.	Summer Quarter.
	°	°	°	°
A.M. 1	+ 34·45	+ 38·77	+ 37·45	+ 36·92
3	34·90	38·27	37·19	36·81
5	35·27	39·03	37·21	37·23
7	36·13	40·22	37·84	38·09
9	36·52	40·37	38·60	38·51
11	36·92	41·27	39·42	39·22
P.M. 1	37·37	41·68	39·82	39·55
3	37·17	41·11	39·71	39·35
5	36·47	41·16	39·13	38·[illegible]1
7	35·28	40·56	38·53	38·16
9	35·38	40·03	3[illegible]·08	37·86
11	34·48	39·58	3[illegible]·87	37·32
Mean	+ 35·86	+ 40·17	+ 38·40	+ 38·15
Mean temp. of sea water	+ 31·50	+ 35·44	+ 36·83	+ 34·96

Highest temperature observed (July) + 55°
Lowest ditto (June) + 24

The temperatures taken on board the Trent, in 1818, when cruizing in a mean latitude of 80° N. and longitude 10° E. gave the following means :—

June.	July.	August.	Summer quarter.
°	°	°	°
+ 33·73	+ 35·98	+ 33·80	+ 34·52 Fahr.

TABLE XLVI.—Some results of a thermometric register kept at Fort Enterprise in 1820-21 : lat. 64° 28′ N., long. 113° 06′ W. ; supposed height above the sea level 850 feet.

Month.	Highest temperature recorded.	Lowest temperature recorded.	Means of Maxima.	Means of Minima.	Means of Extremes.
1820.	°	°	°	°	°
Sept.	+ 53·00	+ 16·00	+ 39·30	+ 28·30	+ 33·80
Oct.	37·00	+ 5·00	+ 27·90	+ 18·80	+ 23·40
Nov.	25·00	− 31·00	+ 2·80	− 4·30	− 0·75
Dec.	6·00	− 57·50	− 2[illegible]·80	− 33·50	− 29·65
1821.					
Jan.	20·00	− 49·00	− 9·68	− 21·50	− 15·60
Feb.	1·00	− 51·00	− 19·10	− 31·60	− 25·35
March	24·00	− 49·00	− 0·90	− 22·30	− 11·60
April	40·00	− 32·00	+ 16·40	− 7·10	+ 4·65
May	68·00	+ 8·00	+ 42·80	+ 20·30	+ 31·55
Means of a year	+ 22·83	− 20·42	+ 6·14	− 4·41	+ 0·86

The following table is compiled from Sir George Back's Appendix to his Journal, but, not having access to his original observations, I have been unable to compute the daily curve for the period,—which the observations, being 15 each day, were numerous enough to have enabled me to do.

Table XLVII.—Containing the daily and monthly mean temperatures for portions of the years 1833-34, at Fort Reliance, near the east end of Great Slave Lake. Lat. 62° 16′ N., Long. 109°. Supposed height above the sea, 650 feet.

Day.	1833.		1834.							1835.	
	Nov.	Dec.	Jan.	Feb.	March	April.	May.	Nov.	Dec.	Jan.	Feb
	°	°	°	°	°	°	°	°	°	°	°
1	+16·03	+17·43	−48·82	−36·41	+12·57	−9·61	+4·59	+29·58	−18·82	−35·07	−46·17
2	+25·61	+15·50	−46·17	−32·41	+27·11	+14·87	+19·13	+25·77	41·15	−18·09	36·0
3	+33·35	+9·71	−13·43	−44·64	+0·85	+33·68	+35·56	+19·61	−30·86	−21·57	−26·27
4	+28·68	+14·51	−17·03	−46·80	−13·60	+0·03	+35·59	+19·21	−43·21	−21·91	−17·32
5	+22·19	+16·52	−5·70	−30·09	+00·40	+11·75	+33·31	+21·07	38·30	−12·26	26·79
6	+12·29	+3·58	−25·82	−12·77	−15·85	+2·21	+33·42	+8·16	−18·26	−13·91	+4·78
7	+24·18	−15·59	−26·80	−2·53	−32·12	+8·05	+32·92	+26·20	−57·97	−21·37	+3·73
8	+23·71	−8·24	−38·08	+7·16	−28·57	+7·31	+23·09	+24·32	−26·75	9·55	−15·62
9	+16·09	+14·26	−31·72	−27·57	−9·92	+7·20	+14·61	+15·10	−9·52	−4·77	+7·43
10	+26·01	+12·57	−29·39	−26·87	+8·03	+20·06	+19·58	+2·87	+7·27	−21·15	1·30
11	+20·61	+13·01	−37·48	−7·01	+0·95	+11·18	+29·21	−10·40	−10·82	−18·22	−2·18
12	+12·73	+20·62	−48·08	+7·18	−1·33	+8·32	+37·07	−16·41	−26·00	−3·89	−19·25
13	2·83	+16·90	−51·75	29·47	+2·50	+7·37	+45·85	−10·65	−16·57	−0·80	−7·[illegible]
14	+1·98	+7·64	−52·56	−28·51	+9·09	+9·57	+39·98	−1·42	−29·25	−12·8[illegible]	24·8[illegible]
15	+16·37	−2·78	−47·08	−12·27	−8·20	+20·72	+31·47	+17·25	−53·91	−20·94	−49·68
16	+10·28	+8·68	−60·33	−3·04	−13·54	−0·10	+37·09	+22·68	35·88	−14·89	−13·05
17	+11·34	−10·77	−54·31	+5·71	25·57	7·30	+24·71	+23·84	−26·21	−6·45	29·[illegible]
18	+15·37	+12·03	−39·63	−6·88	−16·80	−6·95	+27·77	+16·27	−27·88	−15·75	−35·2[illegible]
19	+27·31	−14·29	−46·47	−23·74	−17·15	−8·23	+32·41	+24·94	−37·99	−13·90	39·1[illegible]
20	+1·66	−18·91	−29·46	−28·35	−0·94	+5·02	+39·74	+19·29	−48·58	−4·71	−33·20
21	−6·41	−6·90	−42·63	−33·75	−2·05	+8·18	+49·76	+18·40	−40·25	−5·74	−44·61
22	+3·94	+8·93	−32·85	26·02	−18·13	−13·48	+43·69	+19·45	−30·60	−7·24	−37·01
23	+8·88	−2·14	−19·42	+4·15	−7·33	+20·38	+31·53	+8·40	−55·52	−4·86	−43·85
24	+11·43	−8·25	−12·13	+10·28	+9·48	+23·66	+35·18	+10·58	−31·74	−5·96	35·31
25	+22·06	−26·22	−14·56	+15·20	−5·80	+13·23	+41·51	+18·72	37·14	−17·77	−1[illegible]·27
26	+4·16	+3·16	+16·06	+1·13	−1·37	+12·05	+17·67	+11·68	−28·55	−25·10	−15·6
27	−0·29	+0·42	−36·0[illegible]	+3·21	−11·48	+3·90	+58·69	+9·13	−27·14	−23·20	−25·33
28	+15·15	−15·41	−44·46	+0·64	+1·15	+7·46	+61·56	+8·27	−34·16	−28·27	−11·60
29	+26.43	−35·53	−28·42	..	+5·02	+6·09	+42·99	+5·35	−50·04	−24·88	..
30	+16·03	−35·18	−35·79	..	−3·20	+6·17	+41·83	−25·80	−36·17	−35·2[illegible]	..
31	..	−48·20	−20·73	..	−15·93	..	+59·85	..	−43·52	−44·03	..
Means	+14·82	−1·71	−33·39	−14·37	−6·14	+8·23	+36·03	+12·05	−32·43	16·62	−23·32

Mean temp. of winter quarter (*Dec., Jan., Feb.*) mean of 2 years' obs. . . . . . −2[illegible]·371 F.
" " spring quarter (*March, April, May*) 1 year 1834 . . . . +12·755

The lowest temperature recorded in 1833-34 (Jan.) was . . . . −70·00 F.
" " " 1834-35 (Dec.) was . . . . −58·00

The three following tables give the results of a thermometric journal kept at Penetanguishene, on Lake Huron, in lat. 44° 48′ N.,

long. 80° 40′ W., and 600 feet above the sea, by Mr. Todd, assistant surgeon, R.N.

Table XLVIII.—Showing the mean heat of each month at four several hours, and also the mean of one pair, 8 A.M. and 8 P.M.

Month.	8 A.M.	Noon.	3 P.M.	8 P.M.	Mean of 8 and 8.
1825.	°	°	°	°	°
May	+ 50·41	+ 60·06	+ 62·29	+ 53·55	+ 51·98
June	65·07	71·60	72·87	65·40	65·23
July	70·71	78·06	76·94	70·06	70·38
Aug.	67·16	72·16	73·64	69·93	68·54
Sept.	52·42	56·87	58·23	53·94	53·18
Oct.	44·81	52·26	53·42	46·90	45·85
Nov.	34·19	39·68	41·81	39·13	36·66
Dec.	23·00	25·52	26·16	24·94	23·97
1826.					
Jan.	19·29	21·55	26·16	23·48	21·38
Feb.	17·81	23·52	25·87	21·52	19·66
March	27·65	33·26	34·61	31·19	29·42
April	34·63	39·00	40·67	37·53	36·08
Means	+ 42·93	+ 48·05	+ 50·20	+ 45·52	+ 44·225

In the year 1820 the mean annual heat at 8 A.M. was + 45·42 F.
„ 1823 „ 3 P.M. it was + 46·31

Table XLIX.—Showing the means of the maxima and minima of each month, and the means of the extremes.

Month.	Means of		
	Maxima.	Minima.	Extremes.
1825.	°	°	°
May	+ 63·96	+ 46·23	+ 55·09
June	71·30	61·40	67·85
July	77·40	68·90	73·15
Aug.	74·20	63·25	68·72
Sep.	58·45	51·41	54·93
Oct.	54·06	43·61	48·83
Nov.	42·71	[illegible]·00	37·85
Dec.	27·61	21·16	24·38
1826.			
Jan.	27·87	17·12	22·50
Feb.	26·80	15·67	21·23
March	[illegible]·74	25·90	30·82
April	[illegible]·83	33·06	37·48
Means.	+ 51·24	+ 40·69	+ 45·96

Table L.—Showing the mean heat of four seasons, and of the six summer and six winter months in 1825-26, at the same place.

Periods.	8 h. A.M.	Noon.	3 P.M.	8 P.M.	8 and 8.
	°	°	°	°	°
3 summer months	+ 67·67	+ 73·96	+ 74·50	+ 68·50	+ 68·0[illegible]
3 autumn ditto	+ 43·82	+ 49·63	51·19	46·66	45·24
3 winter ditto	+ 20·11	+ 24·56	26·07	23·40	21·75
3 spring ditto	+ 37 60	+ 44·16	45·91	40·78	39·19
6 summer ditto	+ 52·63	59·06	60·21	54·64	5[illegible]·64
6 winter ditto	+ 32·04	37·17	38·70	35·08	33·56

Penetanguishene is situated on a bank rising steeply from the beach of one of the sheltered bays of Lake Huron. Mr. Todd, in his remarks on its climate, observes, that the spring of 1826 was the earliest he had known during eight years' residence at the place. "In general," he says, "the snow remains on the ground till the latter end of April. In June or July the temperature occasionally rises to 92°, when the heat is oppressive to the sensations, and for the most part precedes a thunder-storm, after which the air becomes cooler. The atmosphere is clear in March; and the ice, which by that time has attained a thickness of 16 inches, begins to dissolve. Snow falls towards the end of October, and the harbour freezes over in the beginning of December." Mr. Todd once only observed the thermometer as low as $-32°$, which was for a few hours in January. 1822. The snow attains a depth of 3 feet in the course of the winter in the woods, but the ground beneath it is not frozen. He thinks that the greatest heat occurs at 3 P.M., and the least at 3 A.M.; but he did not ascertain the fact by a continuous series of hourly observations.

As the mean of the combined observations at 8 in the morning and 8 in the evening is, at Leith and Plymouth, less than the true mean of the 24 hours, but does not in either case differ from it more than $\frac{3}{4}$ of a degree, we cannot err much in considering the mean heat of the year 1825-26, at Penetanguishene, to be about 45° Fahr., or a little more, which corresponds nearly enough with the mean of the extreme temperatures, which is $+ 45°·96$. This is about 3° below the mean temperature of Leith, although Penetanguishene lies upwards of 11° of latitude more to the southward. If we allow, with Dr. Dalton, a depression of 1° of temperature for every hundred yards of elevation above the sea, and augment the mean heat of Penetanguishene in that proportion, it will still be less than that of Leith; and even allowing, as

Mr. Nixon's experiments would lead us to do, a degree for 230 feet, we should only bring them to an equality.

I am indebted to the kindness of Captain Washington for the following highly valuable table of mean temperatures of ten different stations in Sweden, which furnishes the means of making a more extensive comparison between the temperature of Northern Europe and Arctic America. The table was drawn up by Colonel Forsell, of Stockholm, and by him communicated to the Geographical Society of London.

The original MS. is in the centigrade scale, which has been converted into that of Fahrenheit. I am unwilling to extend the length of the paper by mentioning the many interesting differences of climate pointed out, by contrasting this table, or one which may be compiled from it of the mean heat of the four seasons of the year, with those which precede it; and shall merely state generally that, under similar circumstances, the east side of one continent appears to have the advantage over the western shores of the other in the high latitudes, of about 20° of mean annual temperature, and that the isothermal line, in passing from Norway to America, is bent 12° of latitude to the southward. As, however, none of the pairs of places agree exactly in latitude or altitude, these quantities are to be considered as but roughly estimated.

TABLE LI.—Containing mean temperatures of various places in Sweden by Colonel Forsell, of Stockholm.

Months.	L. 55° 42′ Lund. Alt. 60 ft. No. 1.	L. 56° 53′ Wexiö. Alt 500 ft. No. 2.	L. 57° 42′ Gottenburg. No. 3.	L. 59° 23′ Carlstad. Alt. 180 ft. No. 4.	L. 59° 20′ Stockholm. Alt 128 ft. No. 5.	L. 60° 39′ Falun. Alt. 400 ft. No. 6.	L. 62° 38′ Hernösund. No. 7.	L. 63° 24′ Ostersund. Alt. 1050 ft. No. 8.	L. 63° 50′ Umeå. No. 9.	L. 68° 30′ Enontekis. Alt. 1467 ft. No. 10
	°	°	°	°	°	°	°	°	°	°
Dec.	+31·01	+28·66	+34·42	+27·30	+27·28	+24·15	+18·70	+20·95	+13·64	+ 2·44
Jan.	28·51	27·86	29·99	25·60	24·32	18·68	16·32	9·25	11·60	0 12
Feb.	29·10	28·18	30·11	28·42	25·86	23·30	17·04	15·30	14·98	1·92
March	32·36	30·69	34·25	31·26	29·58	28·55	23 78	25·72	22·18	11·52
April	41·29	40·80	43·84	39·64	36·76	37·44	31·04	33·00	33 98	26·15
May	51·69	53·12	53·02	50·30	48·26	47·46	42·38	43·38	43·28	37·20
June	60·31	62·20	61·04	59·34	57 02	57·30	53·30	54·48	51·50	49 02
July	63·25	66·04	64·08	63·44	63·16	60·35	58·64	57·90	61·24	58·10
August	62·64	63·12	61·28	60 80	60·80	57·34	56·25	55·96	56·70	56·72
Sept.	56·17	54·30	55·90	54·18	53·65	50·62	47 48	45·24	47·66	42·06
Oct.	47·01	44·48	48·66	43·90	44·18	43·68	39·24	39·40	38·25	27·45
Nov.	37·90	35·42	38·65	35·32	35·38	30·22	28·50	29·08	27·10	11 75
Annl. Mean	+45·10	44·56	46·34	43·28	42·18	39·92	36·26	35·80	35 42	27·04

NOTE.—No. 1 is the result of 54 years' observations, from 1765 to 1818; No 2 of 36 years, from 1786 to 1821; No. 3 of 46 years, from 1787 to 1832; No. 4 of 10 years, from 1815 to 1824; No. 5 of 15 years, from 1808 to 1822; No. 6 of 9 years, from 1830 to 1838; No. 7 of 30 years, from 1787 to 1816; No. 8 of 6 years, from 1823 to 1828; No. 9 of 9 years, from 1796 to 1804; and No. 10 of 5 years, from 1802 to 1906.

Table LII.—Temperatures at Yakuzk, Siberia, lat. 62° 1½′ N., deduced from many successive years of observation. (M. Erman.)

Hour.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
	°	°	°	°	°	°	°	°	°	°	°	°
6 A.M.	−42·92	−32·80	−41·50	−17·27	+ 8·15	+35·82	+54·27	+64·40	+57·22	+38·75	+11·30	−18·45
2 P.M.	−39·77	−30·77	−36·40	+ 1·63	+30·43	+47·30	+67·77	+79·70	+72·72	+50·00	+21·20	− 9·17
9 P.M.	−42·02	−31·90	−41·80	− 7·82	+17·15	+37·62	+53·60	+61·70	+58·32	+40·35	+13·33	−12·77

The annual mean at 6 a.m. is + 10·25°; at 2 p.m. + 21·54°; and at 9 p.m. + 12·47°; showing that the curve is much bolder than at Plymouth. The mean heat of the year is about + 14°.

Table LIII.—Of six months' temperatures, at two several hours, at Fort Vancouver, in the valley of the Oregon or Columbia. Lat. 45° 37′ N., long. 120° 50′ W.

Month.	7 A.M.	1 P.M.
1835.	°	°
Oct.	+14·48	+55·76
Nov.	37·13	43·60
Dec.	35·65	41·06
1836.		
Jan.	35·33	39·51
Feb.	34·29	44·00
March.	40·45	56·12
Mean of 6 months.	+37·52	+46·22
Mean of 3 winter months.	+34·75	+40·99

The above table, compiled from the Journal of the Rev. S. Parker, serves, as far as it goes, to show the difference between the climate of the shores of the Pacific and that of the eastern coast of America. The heat at the hours of observation is much greater at Fort Vancouver than at Penetanguishene, the greater elevation of which is nearly compensated by its more southern position of 1° of latitude. The temperature at Fort Vancouver is, however, 10° less for the same three months than at Leith, which is 10½° of latitude farther to the north; and for the whole six months the difference is 13° of Fahrenheit. There is, however, reason to believe, that the summer heat is much greater on the Oregon than at Leith.

M. Baer states in a memoir on the climate of Sitka, which did not reach this country till after the preceding paper had been sent to the press, that in the 57th parallel of north latitude the mean annual temperature on the western coast of America is 18° F. higher than on the eastern coast, though still some degrees inferior to that on the western coast of Europe. This coincides with our remark in page 49 of the mean heat on the coast of Norway being 20° above that on the eastern shores of America in the same parallels.—Vide Bull. Sci. de l'Acad. de St. Petersbourg.—Baer, *Ueber des Klima von Sitka, &c.*

XVII.—*On the Province of La Rioja in South America to accompany a Map.* By J. O. French, Esq.

The writer of this paper proceeded in April, 1826, from Buenos Ayres to the province of La Rioja, for the purpose of directing some mining operations. In that province and the adjoining one of Cordova he passed more than two years, during which he had occasion to make several journeys in the interior, and to become, in consequence, acquainted with a portion of South America unknown to Europeans. He is led to believe, therefore, that the following account, taken from his notes at the time, may prove of some interest; and, at any rate, add to our knowledge of the physical features of a large district very imperfectly laid down in all existing maps.

The city of Cordova in lat. 31° 26′ 14″ S., is 172 post leagues from Buenos Ayres, the last 30 leagues of which are diversified with a succession of park-like and forest scenery, which has a picturesque and pleasing appearance, offering a striking contrast to the unbroken monotony of the Pampas of Buenos Ayres.

Within 2 or 3 leagues of Cordova the road makes a decided ascent of about 200 feet, at the summit of which it breaks through low woods and coppices, and, piercing some whitish and yellowish cliffs, suddenly descends and opens out to the eye the broad shallow stream of the Rio Primero, winding round the city. This river is here from 100 to 150 yards broad, and fordable, except during floods. Of these, a remarkable one took place in April, 1828. The waters rushed from the mountains with a roar which was heard in the city several leagues distant; the town was in imminent danger of destruction, and must have been swept away, had not the river timely burst its natural bounds on the right bank. It laid the country under water for sixty miles southward, obliterating all the gardens and enclosures in the vicinity of the city, and covering them with a new stratum of sand. I was then on my way to the city from Buenos Ayres, and travelled with the water up to my horse's flanks. The swollen carcases of drowned biscachas were to be seen in every direction floating on the waters for leagues.

Cordova is a clean town, with broad unpaved streets and neat houses on the usual Spanish construction. The principal edifices, the cathedral and churches, possess little architectural merit.

The climate presents a mean between the extreme humidity of Buenos Ayres and the great and uniform dryness of the adjoining province of La Rioja. It is remarkable for its serenity

and beauty in the spring and autumnal months; then the exhilarating freshness of the air to the seasoned traveller renders a day's gallop and a night's bivouac in the hills—with his saddle and its appendages for a couch, and the starry heaven, nowhere exceeded in brilliancy, for a canopy—delightful. In summer the heat is more endurable in the mountainous part of the province than in the city, which is built, as the natives say, *en un pozo*, in a well. At that season the air is dry and intensely sultry, without a breath to disturb it: on the other hand, on the approach of winter, currents of chill air will sometimes lower the thermometer 30 degrees in a few hours. As at Buenos Ayres, terrific thunder-storms, which have damaged, more or less, most of the public buildings, including the cathedral, are of ordinary occurrence. The soil of the province of Cordova, generally a sandy loam, is not fit for arable culture without irrigation. Very little wheat is in consequence raised; and the small supply required for the consumption of the upper class is imported from San Juan. The lower classes live upon beef, with Indian corn, raised chiefly in the mountain valleys, pumpkins, camotes (sweet potatoes), and fruits. Cattle, sheep, and goats, are abundant, and the market is well supplied with all sorts of common poultry, and a variety of game, hares, and partridges, and occasionally a small species of deer about the size of a large hare, found in the woods upon the table-land beyond the city. The common fruits are apples, cherries, figs, peaches, grapes, the melon, pomegranate, &c., all in abundance. The grape is, however, not cultivated for vintage, the wine used being imported from Mendoza, San Juan, and La Rioja. The *schinus molle* of Molina is found in the mountains growing to the size of a large apple-tree, and a fermented beverage, or chicha, is made from its berries.

The mountains of Cordova are divided into two ranges running north and north-westerly, distant from each other at their northern extremes from 15 to 20 leagues. The intervening country is a succession of stony and sandy flats, alternating with broad pastoral valleys interspersed with plantations of figs and peaches. These ranges are highest where they meet at La Cuesta, and where the height may be about 2500 feet above the surrounding plains. From the summit of La Cuesta, the ascent of which is highly picturesque, the traveller has an extensive view over the wide steril plains reaching to San Juan, and only broken here and there by low isolated hills.

Quitting Cordova for La Rioja, the route for some distance is by the high road to Peru, described by other travellers, skirting the base of the eastern range of the Cordovese hills, and passing through an undulating country diversified with picturesque woods.

The range in question is chiefly of granite and sienite. The Cuesta and its neighbourhood exhibits gneiss passing into mica-slate, sienite, and granular limestone. In the southern and central regions occur whole districts of compact limestone. From Serrezuela, the northern termination of the western range, southward to the middle of that range, are beds of greenstone in contact with a sandstone, which is probably calcareous, and in some instances has a slaty structure; but clay slate nowhere appears, nor is, I have reason to believe, any where found in the Cordovese hills. To the south of the last mentioned localities, the rocks become granitic, and mica-slate occurs, with beds of greenstone, sienite, and sandstone, and scattered fragments of milk quartz, with imbedded mica, are found among the detritus of the valleys.

To the left of the road, prettily situated, are the remains of the old establishments of the Jesuits, now converted into chacras and estancias (farms). These establishments, which generally attract the traveller's attention by a shattered belfry and architecture above the usual standard, appeal affectingly, in these remote regions, to his better feelings, in favour of men who successfully advocated a spirit of Christian mercy and benevolence, when conquest and a war of extermination desolated the land, and bid fair to put an end to the aboriginal nations. The chief, and first met with, of these establishments, is Santa Catalina, about 15 leagues from the city of Cordova. Thence to the N. E. extremity of the Cordovese chain is about 25 road leagues further over barren and rocky undulations, alternating with fertile and beautifully picturesque plains and valleys. Near their northern termination is an opening through the hills, passable with difficulty by a carriage; by which, gradually descending into the plains on the opposite side, we proceeded to the estancia of Las Algarobas, so named from the extraordinary growth of those trees in this district. I was shown a remarkable specimen of one in the neighbourhood, six feet or more in diameter: though the trunk for timber probably did not exceed 15 feet in height, its crooked branches spread over a diameter of not less than 50 feet.

Here we made preparations for crossing the great Salinas, or salt plains; nor were they trifling, considering we had but a single carriage: still that was the first four-wheel vehicle which had ever attempted to cross the Salinas: about seventy horses were collected for the service; a bullock was killed and cut up for *charque*, as it is called when dried for use, the broad pieces of which, hung out in the sun upon *lazos* fastened to the trees, looked like so many clothes hung out to dry: it was necessary, also, to lay in a stock of water for the journey: all this delayed us half of one day, and the whole of another. The family residing at this estancia, as usual in the remoter localities of the

upper provinces, were clothed in ponchos and other articles of their own cotton and woollen manufacture, and were in a comfortable condition of rural life. They presented us with some preserves made of the fruit of the *opuntia tuna*, and other *dulces* or sweetmeats for the journey. The estanciero himself, with whom we had a convivial evening, had lost little of his Spanish blood in intermixture with the Indian, and was a fine old man. He was to accompany us on the present occasion with an Indian, for our guide across the scarcely explored region. This man was a superb horseman, naked save the waistcloth, (chiripa). Under his direction, on April 4, we began our journey northward through an undulating country, partially wooded, the surface soil of which chiefly consisted of small stony and pebbly fragments, producing nothing but a very diminutive but thickly spread species of thistle, or what appeared to be such. At night we reached a hamlet consisting of about half a dozen huts or ranchos of the better sort, where we slept. The following day we pursued a more westerly course through fine open woods, in which we killed a rattlesnake, a rare occurrence in these parts, as it seemed: it measured five feet in length, and had five rings, or rattles; its fangs were nearly half an inch in length. I skinned it to preserve the specimen, but it unfortunately got mutilated by accident, and was thrown away. In the afternoon we arrived at some lonely huts on a bare open plain. The Cordovese hills out of sight and the woods had entirely disappeared; later in the evening we reached a solitary Indian hut, on the borders of the Salinas. Poverty and privation were on the sallow countenance of the inmates of this lone habitation, an Indian, his wife, and a boy about twelve years old. "We can hardly procure meat for ourselves here," was the reply to our demand for supper.

The wretched remains of the Indian tribes still existing in La Rioja live chiefly upon the pods of the algaroba, bruised into a paste they call *patay*. They also make a *chicha* by fermenting them in water—a beverage agreeable enough to those accustomed to it. They seldom taste other animal food than what they obtain in the chase—the flesh of the Vicuña or Guanaco. The Indian family of this hut had completely learnt the art of endurance; they were civil, respectful, and obliging. We slept here preparatory to crossing the Salt Desert, or great Salina, under the direction of our Indian guide, and in, as already observed, the first wheeled vehicle ever known to have entered them. The morning of our departure was ushered in by a cloudy mist, through which the red sun gradually rose, partially dispersing the upper vapours, while others appeared to resist his influence; and, attracted to the earth, remained dense and motionless near its surface. As we entered upon the Salina, the scene became

novel and striking—the wide plain, level and smooth as a floor, and snow-white with superficial salt, stretching its treeless and shrubless waste on all sides to the horizon, unbroken by any object, save a few stunted, straggling, and leafless alkaline bushes, the black and crooked branches of which, contrasting with the whiteness of the soil, were here and there hid and intersected by a broad, compact, and very thin stratum of mist, whose under surface was slightly elevated from the soil, while its upper was below the tops of the bushes; thus permitting only their stems and tops to be recognized. This was the *mirage*. Over head rolled thick and broad masses of translucent white vapour, which, except at intervals, hid the sun without greatly intercepting his light; and when his rays shot between these masses, they were reflected from the space on which they fell; by the saline superficies of the soil, with a dazzling effulgence. Such was the appearance of these vast salt plains at the time we crossed them, in the middle of April. Great changes, however, in their aspect are produced by a variation of circumstances. I have myself observed the most astounding change in the appearance of a portion of the plain of Famatina after sudden rain, (where rain rarely falls except with thunder,) succeeded by a hot sun. In a region where slight saline efflorescence is ordinarily seen, the ground became almost snow-white from the rapid crystallization of saline matter, and reflecting the rays of a fierce sun, rendered it most difficult to keep the sight fixed on the road-track—the landscape appeared in one blaze of reflected light, trees and shrubs seemed on fire, and the whole scene might have been mistaken for the land of the genii; while the hot north wind called the *sonda*, hereafter described — the Siroc of these regions—rose by degrees, and in squalls, to a gale, with a close heat like that of a furnace.*

As we proceeded onward through the Salina, we came to some shallow basin-like hollows, that had apparently been filled with water which had evaporated, leaving a moist blackish earth effloresced considerably with saline incrustations, in passing which, in an untrodden region, caution was necessary. With these exceptions, we pursued our course over this trackless region at a smart gallop during the whole day, the western range of the Cordovese mountains appearing finally on our left front, and giving fair warrant of the accuracy of our Indian guide, who had the sun alone for his compass. The noble horses were in the pride of strength. They had neither food nor water during this day, nor until the evening of the following; yet they flagged not in spirit

* In the instance here related it is to be noted that nothing in the shape of cloud or mist was present; affording, in this respect, a perfect contrast to the journey across the salt plains.

or effort. The scene of lazo-ing them for a remount was frequently of a most animating description: the efforts of the horsemen to collect them together were often frustrated at the point of accomplishment, by the whole breaking bound, and scouring off in wild divergence, until, yielding to their gregarious instinct, they would rally again and again in small groups, till the peons, out-flanking them, would finally catch with the *lazo* the number necessary for the relay.

At nightfall we pitched our bivouac upon the margin of a plain very slightly elevated above that of the great Salina, where the first effort of vegetation, consisting of mosses and stunted thorny shrubs, from which it was barely possible to collect the materials of a fire, was struggling to display itself, the air chill and damp as it always is in the Salinas, however hot the day may have been,—the night moonless and starless. It was a lonely melancholy spot, apparently as little frequented by beasts as by man.

Advancing, next morning, westward over a trackless plain, sprinkled with stunted shrubs, and with the Serrezuela of the Cordovese range in sight on the left, we fell into the post-route leading from Cordova to Simbolar, and approached a more wooded region. In the way through these woods we passed an algaroba tree marked with a cross, which, it is said, commemorates the death of a Franciscan friar, who, having here pitched his bivouac for the night, was attacked by a jaguar, and pursued up the tree on which the memorial is carved.

We were more than once disturbed, at night, after our fire was kindled, by the yells and low growls of these animals, which we afterwards tracked through the woods: on one occasion no less than five of them were seen about us. The surface-soil through these woods is a loose and friable clayey loam, occasionally saline and efflorescent—grassless until within three leagues of Simbolar, when it becomes more compact, and covered by thin woods, chiefly of the algaroba, with abundant pasture. As the post of Simbolar is neared, the plain gradually becomes an open and treeless savannah; but at the post itself the woods re-appear on the onward route. The algaroba is everywhere in these woods abundantly distributed with others of the leguminosæ. The cacti are not so common as in the rocky and sandy plains of Arauco and Famatina. Simbolar is a post-station and hamlet, and the extreme S.E. habitable point of the province of La Rioja, and of the district of it called the Llanos: it is the last post-station in La Rioja, in the route to Cordova, and furnishes horses for crossing the Travesia, 24 leagues, to Serrezuela, on the Cordovese side. From Simbolar the country

traversed, by the old route, as far as La Cienega, is undulating, and covered with pretty dense woods, in which the algaroba still predominates. The post and hamlet of the Cienega occupies a most picturesque sylvan spot, adorned with groups of fine trees, among which the dwellings are loosely scattered. Milk is here abundant and good cheese is made. From this hamlet to that of Polco, about 4 leagues in a north-westerly direction, an undulating and interesting woodland country is traversed. I had a fruitless chase here after an iguana 3 feet in length; it is esteemed good eating by the natives. Polco is also situated on the margin of the great desert we had crossed, and upon the eastern habitable limits of the Llanos. The ground is here alternately rocky and woody, consisting, in some places, of beds of sienite and of sandstone, which crop out on the plain, and close to the hamlet a range of low rocky hills runs northerly and intersects the country for several leagues. (The traveller falls in with them again at Hediona, the next post-station.) Under this low range, among rocky and verdant dells, sprinkled with low woods, and intersected with green alleys, the cottages and huts of Polco are scattered, surrounded by small picturesque inclosures of vines, gardens, and Indian corn. Here we passed the night, the sixth since leaving Las Algarobas; having passed one in the woods between San Francisco and Simbolar, and another in those between the latter and La Cienega. Travelling in a vehicle through such regions is difficult work; we ran the greatest risk of its demolition. In the woods of La Cienega the horses dragged it over bushes, roots, and stumps, at the frequent risk of overturning it or breaking it in pieces. Not unfrequently we had to alight and cut down trees ere we could make our way through the woods. Still the scene was animating—the thoughtless peons cheered as they got on, apparently caring much less for the live lumber within the carriage than for the credit of getting rapidly over the ground. In these woods we met the two deputies of La Rioja on horseback, on their way to join the Congress at Buenos Ayres, and I could not help envying them their safer mode of conveyance through these wilds. Snakes, some of them venomous, are found in these regions; one in particular, a small black snake about 9 inches long, called aspa by the natives, is reputed deadly. The pumas are numerous in the Llanos, and are very destructive to the goat flocks: the jaguar is also found, but here and in the Cordovese mountains of a size much inferior to that met with in the lower provinces. I once purchased two skins which had only the day before been taken, the length of which did not exceed 4 feet. The jaguar is believed by the natives not to attack man unless he has tasted his blood. A species of the peccary, and another of

the armadillo—the *quiriquincha* of the natives—the latter excellent eating, and, when roasted, of the flavour of delicate young pork—are also found in the woods. I have shot some splendid varieties of waders on the ponds of the Llanos. The skunk, the zorino of the natives, and a large species of fox, are common, and infest the gardens of the villages. Flocks of green parrots, of two species, one of them small, are frequently met with in the inhabited valleys, and two species of wood-pigeon, and a diminutive dove, abound among the gardens and plantations, to which the parrots also resort. Wild asses are numerous in the neighbourhood of the Llanos. I once met a drove of 800 of them proceeding to Salta for the Peruvian mines: they are purchased at about 1 dollar each, from the peasants who catch them, and, after wintering at Salta, fetch from 8 to 12 dollars each on their arrival in Peru,—that is, such of them as do arrive; for the owner is fortunate if he loses not more than half the original number in their transport from the Llanos to Salta.

Hedionda, the next post from Polco, situated on the northern verge of the rocky hills before alluded to, consists of a few huts and a well of brackish water, from which it derives its name of Hedionda, or stinking. We noticed here some remarkable and enormous spiders, nearly 3 inches in diameter, and covered with short erect hair. The road from Polco to this post continues through the woody skirts of the great Travesia. The trees belong principally to the leguminous order; some of the acacias producing gum. The saponaceous acacia also occurs.

Beyond Hedionda the road is skirted on the left, for the greater part of a league, with steep low cliffs; it is stony, and appears to have been at some period the bed of a torrent. Emerging from this locality, low picturesque woods skirt the left, and the track breaks finally into the Travesia, in a direction N. and S., parallel to the line of the Rioja mountains, which are seen at intervals. The post-distance from Hedionda to the town of La Rioja is 32 leagues. The scene presented by the woody region of this part of the Travesia when traversed in autumn, after the fall of the leaf, is almost as wild as that of the salt desert itself. The interminable low open forests are varied by long avenues, alleys, and vistas, paved with a compact and hard clayey soil as flat and level as if laid with a trowel, although split into fine reticulated fissures by the sun's action, and destitute of grass or herb. These alleys, which sometimes spread into considerable openings, fringed with clusters of the algaroba, are called by the natives *barreales*. They appear to be formed by streams of alluvial detritus brought down by the torrents from the central Andes. The forest is everywhere cut through by them, sometimes for 15 leagues in

extent. In passing over them the horses' unshod hoofs patter aloud on the compact floor, the sound being more striking from the death-like stillness which reigns around. In these forests we saw neither beast nor bird of any sort; but, on another occasion, I encountered myriads of locusts, motionless, and literally heaped upon each other, covering the bark of a decayed fallen tree, glistening in the sun, and arraying the old trunk with a variegated shining armour of intermingled bronze, brown, and greenish-yellow; altogether presenting a very singular appearance. On the same journey, after an unexpected shower of rain, which fell in slight and distant drops, my horses' feet were on a sudden beset with small toads (*sapitos*) not an inch in length, which the peons declared fell with the rain.

On nearing the town of La Rioja, the plain becomes at intervals slightly raised, the woods alternate with more open spaces, covered with granitic or sienitic debris, and sprinkled with low black thickets of thorny shrubs. As we passed on, we found a party of Riojanos with their chief, a military officer employed in cutting a more direct road through the woods; but the felling of the trees and clearing them off formed the whole operation. The jolting of our vehicle over the stumps left in this new road, over a portion of which we passed, was intolerable.

From the southern extremity of the Rioja chain at Colorados, so called from the beds of red argillaceous and ferruginous sandstone there occurring, the town of La Rioja, situated on the eastern side of the chain, is distant about 25 leagues; nearly the whole interval being unfit for cultivation, from the want of water sufficient for the purposes of irrigation. It is only in a very few places that a scanty supply may be obtained from some mountain streamlets, which descend from the Rioja range into the great plain, or in a few depressed situations, miscalled Cienegas or marshes, where the casual rains appear to be in some degree retained by the subsoil.

On entering a cultivated belt which encircles the town, the traveller finds himself suddenly amidst green lanes and vistas, gardens and plantations. Enclosures of alfalfa or clover, the vine, orange, and citron, flourishing luxuriantly, and fenced with hedgerows, present a striking contrast to the wildness of the neighbouring plains, and the barren heights and elevated slopes and terraces of the Rioja mountains about three leagues distance beyond. The rich vegetation in the neighbourhood of the town is the result of irrigation by means of azequias, or water-courses, from a considerable mountain-stream, issuing from the Rioja mountains, near one of the very few passes by which they can be crossed, and situated immediately opposite, and

to the west of the town. About 7000 barrels of wine, of 16 gallons each, and 100 of brandy are made here annually; a small quantity of cotton and maize is grown; no wheat, but a little barley is sown for green food for cattle and horses. Few, however, except horses for the saddle, and milch cows, are, or can be kept in the neighbourhood, for lack of sufficient pastures. The cattle for consumption are chiefly brought from the department of the Llanos, where about 16,000 are annually reared.

The town of La Rioja consists of a plaza, or great square, from the corners of which the streets are carried, as usual, onward in a right line with one side of the square, and at right angles with another; the adobe, or sun-burnt brick, being the material principally used in the construction. This material, a very suitable one for the climate, is, however, so generally charged with nitre and saline matter, that, unless the earth it is made of be well cleansed from the salt by washing it, the foundations of the building, if the work be slowly carried on, may be seen mouldering before the superstructure is completed. Many of the houses occupy extensive sites, including orange plantations and gardens, and there is one very fine garden in the suburbs, belonging to the family of San Roman. The town possesses no building of any pretension, although the principal houses are substantially, and some of them neatly built. They are all constructed on the ground-floor, with unglazed windows. The ecclesiastical establishments, of which San Francisco Solano was the principal founder, were fast going to decay when I was there; the parish church of San Nicolas in the public square was little better than a large barn; the convents were nearly cleared of their old inmates, and the property belonging to them was about to be alienated and sold.

The whole population did not exceed 3000, or 4000 persons.

The site of La Rioja, which was founded in 1593, by Ramirez, was originally that of an Indian settlement: there is a tradition, that upon the arrival of the Spaniards, the Indians built a dyke or breast-work in the mountains, to arrest the descending stream, in order to let loose the accumulated waters upon the invaders of their country. The remains of this dyke (calicanto) are still extant; but I should rather suppose it to have been constructed to retain the waters for the purposes of irrigation.

To the northward of the town, and district of La Rioja, in the line of the mountains, lies the district of La Costa, where by irrigation about 2300 fanegas of wheat are annually raised, and a nearly equal quantity of maize. This district extends northward along the Rioja mountains to Catamarca, and with that of the capital, and the country south along the line of these

mountains to the Llanos, forms one of the four departments of the province—that of Arauco—which is thus bounded on the west by the Rioja mountains; on the east by the great desert plains and Travesia; on the south by the department of the Llanos, including a portion of the Travesia; and on the north by Catamarca.

The climate of the whole department of Arauco, and the town of La Rioja, is hot and dry—the thermometer rising to above 100 Fahr. in the shade. In the valley of Famatina, where it rises to a similar height, the refreshing south wind springs up at eve after a hot day, and diffuses a delicious coolness; but on this eastern side of the Rioja hills the oppressive sultry air is even more intolerable by night than by day.

From La Rioja we prepared to cross the mountain, the Sierra Velasco, into the Famatina valley beyond, by the only pass which occurs in its whole extent to its southern termination at Colorados. The estimated distance across this chain is 12 road leagues, and is probably about 7 direct. It contains granite, gneiss, mica-slate, greenstone, sandstone, and limestone. Near its S.E. termination at Tutcun, lime is made from a tufa or travertine.

It may here be observed, that in this part of the province of La Plata, primary, and also secondary and altered rocks appear to skirt the Andes, as in the Cordovese range, which contains granite, gneiss, greenstone, sienite, and primitive and secondary limestone; but no clay-slate appears until we approach nearer to the central ridges of the Andes, as in the Famatina range, where I first found the clay-slate in superposition to the gneiss, &c., agreeably to what has been observed of a similar distribution southward in the Cordillera in Peru. In the Andes to the westward of Famatina are found large beds of rock-salt. Gypsum is found northward in the Rioja mountains, and is used for making whitewash.

The road from La Rioja to the Quebrada, or pass through this Sierra, runs by the course of a mountain-torrent. The distance to the mountains is about 3 leagues. As they are approached the soil becomes sandy; but the vegetation along the banks, and in the vicinity of the stream is luxuriant, and includes a variety of cacti with gorgeous flowers—crimson, white, pale yellow, and pink, and the *flor del ayre*, or air-plant, floating from the branches of the larger trees.

The ruins of an old fort, erected by the first settlers as security against the Indians, were pointed out to us. On entering the Sierra we passed through long sandy ravines skirted with cliff and rock, variously wooded, and occasionally opening into

wider valleys, strewed with large blocks of reddish and whitish sienite, sandstone, and granitic rock. The strata on this side of the range appear to have undergone considerable disturbance. The principal of these ravines extends for nearly 3 leagues, throughout which it is floored with a smooth and regular bed of quartzose sand, and is flanked by dark mural elevations of granitic rocks more or less blackened on the surface. These are interspersed by groups of large trees disposed in terraces, which, shadowing the broken rocks on either side, present a singularly wild scene. The banks of the mountain-stream, which is several times crossed in the ascent, are clad with varieties of the mimosa, myrtaceæ, and other tribes. One species, an elegant tree about 12 feet high, has a delicate lanceolate leaf possessing a fine citron-scented fragrance; it probably belongs to Monimiaceæ. The tall mast thirty feet in length, of the stately cactus peruvianus is conspicuous. In the upper part of the ascent a singular and colossal block of brilliant white granite lies across the bed of the torrent, forming a natural bridge, the ends resting on broken ledges or boulders of rock, round which the waters foam onward. Shortly after we reached the most dangerous part of the road called the *Cuestas*, or steep ascents, said to be more difficult of transit than the passes of the great Cordillera. Near the summit, and on the slope of one of these steep acclivities, which we passed on our mules with considerable difficulty, stands a huge block of blackened granite, hollowed out by natural agency, called the *Casa de Piedra*, which serves for a traveller's refuge. The hollow forming the apartment is about 10 feet high. the floor about 12 feet square; there are two large openings, one on the east side, the other on the west. The rock appears as if about to "topple down" from the small inclined platform on which it stands, into the gulf beneath; it is, however, quite secure. Its external form is nearly that of a cube somewhat irregularly truncated and rounded at the angles. Other semi-spheroidal blocks of granite, hollowed out on one of their vertical sides, occur in the same vicinity: they are nearly all covered with a greyish-brownish or greyish-blackish incrustation like that of the Casa de Piedra, and some possess a semi-metallic lustre. On some of the heights in this vicinity, as well as on the opposite side of the Sierra, we saw some *guanacos*, generally in small groups of from 4 to 10. These animals are sometimes tamed and domesticated at Famatina, and become exceedingly familiar, but in that state evince a most mischievous curiosity. Beyond the Casa de Piedra alternate dells and steep rugged cuestas are crossed, broken by stony debris. We bivouacked in a glen for the night, where the mules were turned to pasture on the hill-side, no grass

being found in the valleys. There was a hoar-frost in the morning, which opened serene and beautiful. The onward route led through precipitous cuestas. In passing through a narrow sandy ravine hemmed in by cliffs, I was struck with the appearance of a wall of columnar greenstone 50 feet in height, the colour a greenish black. The columns composing it were not prismatic, but joined each to the other, presented an uninterrupted mural face for 50 feet, smooth as if chiselled. At last we reached the highest point of the ascent, where the pass suddenly opening out, revealed to us the great plain of Famatina, with the *Nevado* or snowy range stretched like a vast curtain across the sky in the west. It was owing to the extreme serenity of the weather, and the absence of the white gauze-like clouds that generally hang over the intervening plain, that this magnificent prospect was on this occasion obtained. Many times afterwards I passed the same spot without having a similar view.

The plain before us, and which lies between the parallel ranges of La Rioja and Famatina is about 7 leagues in breadth. The descent is rugged and precipitous, and not without danger. As the Quebrada or Pass opens into it it becomes sandy, and is strewed with broken rock and boulders, and fragments of quartz and felspar, interspersed with a few mountain-trees springing wildly from among them. A species of the geranium 3 or 4 inches in height here grows like a weed.

The road across the valley of Famatina runs nearly in a direct line from the Pass to the hamlet of Nonagasta, about 7 leagues distant; another branch of it runs in a more northerly direction till it reaches a remarkable chain of low hills nearly parallel to, and about 3 leagues distant from, the escarpments of the Famatina mountains. This route terminates at Chilecito, the *Asiento de Minas*, or mining head-quarters, situated on the western edge of these low hills, about 4 leagues from Nonagasta. These hills are remarkable as being the only elevations which break this great valley throughout an extent of from 40 to 50 leagues from its southern point at the Colorados. They commence about 3 leagues south of Chilecito, and extend 12 more to their northern termination at Famatina.

On entering the valley the soil changes gradually from a quartzose sand to a fine sandy loam exceedingly friable, and producing a fine deep dust, clouds of which are raised by the passing mules, whose route may be marked by it for leagues across the plain. Sometimes it is raised upwards by eddies of wind in compact cylindrical columns to the height of from 50 to 100 feet. Clayey tracts alternate, and the surface is frequently covered with salt, as is, indeed, almost every part of the valley occasionally.

Looking from the centre of the valley, one magnificent continuous

wall, presented by the Rioja range, with an almost unvarying elevation above the plains of about 3000 feet, appears to skirt it to the E. along its whole length, while on the opposite side the Famatina chain, bounded by the Nevado, or snowy range beyond, seems to fall off in height as it runs S., and, unmarked by the uniformity which characterizes that of La Rioja, trends to the W., forming at last a sort of truncated termination or elbow at the southern extremity of the great valley. The Rioja range, on the contrary, preserves its direct general N. and S. line to its termination at the Colorados.

The red sandstone which gives its name to that place (the Colorados) appears horizontally stratified: it is slaty, siliceous, and argillaceous; its surface powders and oxydated with iron, under the progress of disintegration, produces a red dust resembling brick-dust.

The southern part of this great valley is a miserable barren desert: though brackish springs occur at Colorados, no fresh water is to be found throughout the whole extent northward, from that place to Bichigasta, a distance of 22 leagues, except one small spring which bursts out in the midst of a soil highly saline, at a place called La Ramada, about 14 leagues N.N.E. from Colorados, on the flank of the Famatina range. Not a blade of grass is to be met with in all that distance, though the central parts of the plain are at first scantily covered by stunted mimosæ, and further north with woods more or less dense.

Bichigasta is an Indian village on the side of the Famatina range, and the country for six leagues to the north of it is covered by a rough stony detritus as far as the hamlet of Nonagasta, where, in consequence of the facilities for irrigation, vegetation once more improves. Here the first object which catches the eye of the traveller, if he arrive in due season, as I did, is a brilliant hedge of roses 15 feet in height and 250 yards in length. This hedge, which bounds a vineyard, and the road forming the southern entrance of the hamlet, is covered with a profusion of magnificent flowers like the large common garden rose, and forms a charming object, especially to one arriving from the barren wilderness I have been describing. The vine thrives luxuriantly, and three or four flourishing wine-making establishments were in full activity when I was there.

In an open space in the neighbourhood is to be seen the site of an ancient Indian station, with a mound of truncated conical shape, on which, tradition says, the domicile of the cacique was erected. The stream which fertilizes the environs of Nonagasta rises near Sañogasta, another hamlet on the flank of the Famatina range, and surrounded on the south and west by beautiful woods. Auriferous ores, obtained from the Cerro Morado of the Fama-

tina range, are here ground and amalgamated in a trapeche or mill, worked by the mountain stream. These ores are from the mine of Don Ramon Doña Davila, who resides here in a neat and convenient dwelling, romantically situated and superior in style to the ordinary taste of the country. In the luxuriant and picturesque woods of this neighbourhood a sort of plum-tree flourishes, the fruit of which is called *guindu* by the natives. The peach thrives everywhere, wild and cultivated. A tree called *bisco*, is also in abundance, the wood of which is of great weight and hardness, and in appearance bears great resemblance to the rose-wood of Brazil: planks may be cut from it 20 feet long by 3 feet in width. A brother of Don Ramon Davila had some of this beautiful wood made up for the first time into household furniture, under the superintendence of an English carpenter, during my sojourn at Nonagasta; the same individual, when I left the place was constructing for himself the first pump ever seen in that country. The mode of clearing water from the mines is by hide buckets; a miserable resource, the inefficacy of which has caused several mines of reputed value to be abandoned.

To the north of Sañogasta a ridge of granite runs easterly from the Famatina mountains for some distance into the plain, forming a sort of natural boundary to this locality. North of this line, and for the whole distance, 7 leagues N.E., to Chilecito the country is again steril and rocky, and filled with granitic debris.

The neighbourhood of Chilecito, both west and east of the range of minor hills, presents large tracts covered by granitic and sienitic detritus, only varied in the vicinity of streamlets and torrents from the mountains, by beds of sand, and occasional patches of vegetable soil, producing the leguminous, myrtaceous, and laurel tribes in many beautiful and graceful varieties. In such localities are situated the villages and hamlets of Chilecito, San Miguel, and Anghinan, Sarmientos, and Mallagasta. In the vicinity of all those hamlets, every spot of soil to which irrigation can be applied teems with rich vineyards and clover, or with gardens in which the fig-tree, the peach, the walnut, and olive abound. Chilecito, as already observed, is situated near a remarkable ridge of low hills, the geological structure of which is deserving of notice, in connection with the great mountain chains in the vicinity. To the north of Chilecito they are intersected by the beds of ancient torrents, now filled with granitic boulders, and large rounded stones, at intervals piled in ridges, and alternating with tracts of sand and clayey loam: great blocks of sienite and greenstone also occur. Neither the commencement nor termination of these torrent beds is discoverable; both must therefore have been obliterated by subsequent deposits on the

surface of the plain, which here exhibits appearances of great disruption and aqueous action. The hills themselves have much of the conical appearance of granite hills, but are composed of a sort of coarse and very fissile gneiss, easily detached at the summits in cuboid and rhomboidal slaty fragments, but, as just observed, exhibiting in the mass no regular stratification. The mica of this stone occurs in coarse looking patches of a dirty brownish and greenish black colour. Large-blocks of flesh-coloured felspar, and rocks and boulders of sienite and greenstone appear at the bases of these eminences, which are strewed with fragments of milk and rose quartz, cemented to rather large plates of brilliant pearly laminated mica, schorl, &c. The gneiss at the summits of these hills appears to be undergoing disintegration from the decay of the mica: the only vegetation on their sides consists of the cacti, and a few stunted shrubs. Their height probably no where exceeds 250 feet above the plain.

About six leagues beyond Chilecito on the road to Famatina, the rocky debris are succeeded by a clayey soil, producing a better though still a dwarf vegetation: ten or twelve leagues north from Chilecito commence the huts or hamlets of Famatina, so called, scattered in romantic spots in valleys between the low hills at the base of the great mountain range. The most northerly of these hamlets are Indian, the rest Creole. They are almost concealed by enclosures green with the vine, the fig, peach, and orange trees. From shallow azequias or water-courses plots of Indian corn and trefoil clover are irrigated: of the latter several crops are produced in a season. The Indian corn is not used for bread, but the heads are boiled, and constitute the dish called choclo by the natives. The pumpkin here is greatly and justly esteemed for its fine quality; peas are produced in perfection; the artichoke, cauliflower, and cabbage thrive freely, and successful efforts are making in the cultivation of the potatoe, whose diminutive root occurs indigenous in the Famatina mountains. The verdure is very striking in the irrigated spots in this vast valley; these are, however, comparatively but a few specks on its surface. Immediately beyond their narrow limits the wild inhospitable plain bristles with rocks and cacti, and low thorny thickets, interspersed with meagre woods and coppices, chiefly of the algaroba, but including many varieties of thorny and other leguminous trees and shrubs, known by the natives under the names of chañar, brea, quebracho, tacoquenti, and the humo, the latter an alkaline shrub, from the ashes of which a lye is made for the home manufacture of soap. Most of these are thorny—the prevailing foliage is linear, lanceolate, and ovate, and a large proportion is compound, and variously pinnated.

In favoured spots occurs the tala, a magnificent evergreen, the

dense and impervious foliage of which affords an impenetrable shelter from the noon-tide sun. The tala grows to the height of 40 feet, and spreads its branches, densely clothed with a small dark-green leaf resembling that of the myrtle, almost horizontally over a diameter nearly equal to its height.

Such are the general features of this great valley, the average breadth of which may be about 7 or 8 leagues. The torrents in the rainy season in the Famatina mountains bring down from them considerable quantities of sandy and clayey alluvium, which is carried far into the valley by the swollen streams. This increase of soil blending with vegetable decay, and the pre-existent saline soil, is annually adding to the surface of the valley available for cultivation.

The climate of the plains of La Rioja is hot and dry. On Dec. 24, 1826, the thermometer rose at Chilecito to 106° Fahr. On the preceding evening, at 5 P.M., it was at 86°. The minimum of summer heat, at the hottest portion of the day, is probably seldom below 80°. The lowest temperature occurs in June and July; the highest in Dec., Jan., and Feb. During the summer months partial, but terrific and destructive storms of thunder and lightning, and hail-stones, frequently sweep over the valley from the mountains in the west. Rain to any extent seldom occurs, and snow very rarely, on the Rioja range, though it is common, at all seasons, on that of Famatina. During nearly two years' residence on the spot, I never but once saw the Rioja hills covered completely by a fall of snow. Speaking of the hail-storms, they are terrific, and the noise they make in their descent may be heard 3 or 4 leagues distant, like the roar of a distant cataract; of this I was myself a witness. The stones are of a size so large as to endanger the lives of animals exposed to its fury. The thunder-storms of the Famatina range often break there without descending to the great valley below: of this I remember a remarkable instance on the 8th Dec, 1827, 2 P.M. The whole of the Sierra and the Nevado, from being hid by a mass of dark vapour, was suddenly exposed to view by the bursting of a tremendous storm of thunder and lightning, whilst I stood a spectator in the plain below, surrounded with a serene sunshine and a bright sky. The rolling masses of cloud among the hills, and the reverberation of the thunder, produced on this occasion altogether a scene I shall never forget. The mountains of Famatina are at times covered with snow, the cold south wind blowing above, whilst below in the valley, perhaps, the thermometer stands at 90°, and the hot north wind, or *sonda*, the siroc of these regions, is raging. This wind, which usually rises in gusts, increasing to a strong gale from the northward, at times fills the atmosphere with clouds of sand and dust, as impervious as a dense fog. Its

whirlwinds raise the sand in the western valleys of Catamarca into cónical hills. During its continuance the houses are obliged to be shut up, and the heat and suffocation become most oppressive: the animal fibre feels both relaxed and dried up, as if by an oven. This noxious gale produces an effect expressed by the natives by the term *sequedad*, or dryness; and other diseases, particularly the synochal and sometimes typhoid fever, are aggravated by its influence. The thermometer rises considerably at its commencement, and falls again as it goes off. It occurs exclusively in winter.

Goitre, to a frightful extent, occurs in the province of La Rioja: few women are wholly exempt. It is also frequently attended with mental imbecility, or complete idiotcy. I have seen the tumour vie in size with the abdomen. It exists in this aggravated form in the valley of Famatina. It cannot arise from the use of snow-water, as the miners, who use no other, are, more than other individuals, exempt from it.

The habitable spots of this valley were once the abode of a peaceful race of aboriginals, whose chief occupation consisted in hunting, and in gathering, for subsistence, the fruit of the carob-tree or algaroba—the harvest or gathering of which lasted for two or three months in each summer. They appear, as far as tradition sheds a light on their condition, to have lived in patriarchal simplicity. Equally untutored and superstitious with the tribes of Pampas Indians, the original inhabitants of these valleys of the Andes, who must have formed a considerable tribe or nation, appear to have been remarkable for the absence of all ferocity of character; their descendants, even now, after many years of subjugation, present many points of interest and of admiration; they are simple, sober, and chaste in their manners; and the more benevolent and pacific spirit of the Indian, compared with that of the creole, is here well known. The Indian who engages himself to serve as a guide or peon, or even vineyard labourer, is a more steady and industrious servant than the creole peon, although, when living among his own people he is, when not employed in hunting, a most indolent being. As a guide, he possesses fidelity, patience, activity, and endurance. Among his tribe, his revels, if such may be designated their simple festivals, are never accompanied by the brutalities too often characteristic of the creoles here, as well as of the southern Indian. Inebriety among these Indians, when it does occur, is never marked by brutal excesses; their quarrels are never sanguinary, like those of the creole, of whom it is said, and, as far as my observation goes I can believe it, that the admixture of the Indian and mulatto produces a disposition more cruel and revengeful than any other.

The Indian of these regions is of middle stature, complexion

varying between dark olive and copper colour, frequently a blending of both; hair black, strong, straight, long, and exuberant; teeth fine, white, and regular; eyes very dark, and, under excitement, finely brilliant and expressive; cheek-bones rather elevated. The women are broad-chested, full-breasted, round limbed, and seldom thin in their persons. When pleasurably excited, their face exhibits a peculiar and pleasing expression, though it cannot altogether hide the natural and settled gravity which, more or less, belongs to it. But the Indian reserve is not allied to ill nature. Located in wildly-picturesque regions in these valleys of the Andes, the spirit of the lone, magnificent, and solitary scenery seems to be impressed on their temperament, while the sense, perhaps, of their being the feeble remnant of a conquered race, gradually sinking to extermination, may have its share in this characteristic. In their habits of life they are simple and temperate, avoiding, as much as they can, any close intercourse with the creoles, although a few of them hire themselves to work in the vineyards of the creole proprietors, and, as above observed, make better labourers than the creoles. They inhabit villages of their own, apart from the latter, and are governed by their own caciques: they intermarry exclusively among themselves, retain the domestic use of their own language, which is not *quichua,* pursue their own peculiar mode of life, and assimilate with the creoles in nothing but the having ostensibly embraced the Catholic religion. The introduction of Christianity, however, among them appears, as among the Peruvian tribes, to have had but small effect in changing their social, moral, or intellectual condition.

Looking westward from Chilecito, the first portion of the Famatina range presents the appearance of a projecting table-land. Beyond, and to the N.W., the distant elevations rise above each other very uniformly to the Nevado. The same geological formation which pervades the Rioja range re-appears in the granitic and composite low hills of Chilecito, and the conical granite hills which are passed in ascending the Famatina range from Chilecito, and still higher up at the point named La Cienega. This ascent is by a succession of quebradas, or ravines, the bottoms of which are strewed with granitic debris, to the several heights called the Cerro Cienega, the Cerro Negro, and the Cerro Morado. The Cienega is the first; here, and further westward in the range, gneiss and granite are found, passing into clay-slate, which toward the centre and summit of La Cienega, frequently resembles killas, but is deficient in the silky hue of the latter. In such ground a mine was opened in the Cienega. In some of the central passes among these elevations the gneiss forms mural beds and terraces, distinctly stratified; most of the summits, however,—the highest always—

presenting different modifications of clay-slate, in which occur beds or masses of hornblende, sienitic, greenstone, and quartzose rock,—*the quijo blanco* of the natives. In some of the central elevations, called the valletos, or small valleys, and also in the Cerro Mexicana, the slate is very light coloured—a greenish, or rather greyish white, which becomes tarnished by the oxide of iron on exposure to the atmosphere. In some parts of the Cerro Negro it appears to pass into hornblende-slate. A vein of magnetic iron-stone, of which I possess a specimen, occurs in the Cerro Negro. Varieties of siliceous slate,—some of which are used for whetstones,—occur in this range. Garnets are also found, and steatite, in the veins of the Cerro Negro. In these and others of the central heights, and in the dells, sienitic hornstone, and altered rocks, containing more or less of iron, appear to be undergoing the process of extensive disintegration, producing large masses of a light ochrey dust on the hill sides and brows. Rapid disintegration is going on both here and in the Cerro Morado, and, as before observed, is contributing annually alluvial matter to the great valley, as carried down by the floods.

Proceeding up the pass leading to the Cerro Morado, also called *El Oro*, or the Golden Mountain, is a comminuted thin slate, which, slipping and sinking under the mule's tread, renders the ascent dangerous and impracticable during, and immediately after, rain in the mountains. High up in this mountain are minor hills, whereon the clay-slate friable as a shale may be found in a gradual state of disintegration, and an incipient soil forming, in which a wild potato not larger than a small gooseberry, is found vegetating.

A stream called El Rio, or The River, descends from the Morado, which, joining another from the N.W. from the neighbourhood of the elevation called the Caldera, supplies Chilecito and the neighbourhood with water. Before reaching that place it also turns (at *Candelaria*) a mill for grinding and reducing by amalgamation ores of silver; a similar establishment exists also at the foot of the Cienega. This stream in its upper branches is highly chalybeate. The Morado and the neighbouring mountains are largely impregnated with iron in almost every variety of its mineralization; its sulphates and oxydes deposited by the descending streams tint with shades of green and brown the white boulders and rounded stones on their margins. Native sulphate of iron is found.

In the Cerro Morado vast masses of sienitic greenstone and quartzose rocks are imbedded in, or alternated with, the clay-slate superimposed on the gneiss. The elevations of this Cerro are intersected with broad veins containing a friable and highly ferruginous indurated earth of a composite nature, but exhaling a strong

argillaceous odour. This earth contains deposits of auriferous cellular quartz, in which iron variously oxydated, but chiefly in the scaly oxydes is interspersed, and is apparently the agent in the disintegration going on in the quartz. Large specimens of this quartz, with fine grains of gold here and there visible on the surface, may be obtained. Copper and iron pyrites, said also to be auriferous, occur in these veins. Veins of pure scaly oxyde of iron are also met with, and are likewise regarded by the native miners as *creaderos*, or indications of the proximity of gold. Some of these auriferous veins attain the breadth of several yards, and in 1827 yielded from 1 to 20 or more ounces of gold in 50 cwt. of ore. Two of them, one being that of D. Ramon Doria Davila at Sañogasta, are worked with profit. Much gold doubtless exists in this district; and it would perhaps not be difficult to extend the present works without risking any great amount of capital.

The climate of the Morado is mild in comparison with that of the other great central elevations of the chain, both in respect to cold, and to the still more important circumstance of the *puna*, of which I shall presently speak. One almost continuous elevation, called the Rosario, connects the Morado and the Cerro Negro and Cerro Cienega; between these and the Nevado lie the ranges severally called the Valletos, the Tigre, and the Mexicana: the latter is perhaps within 300 feet of the height of the Nevado itself; the summits of the Cerro Negro, Morado, some part of the Valletos and the Tigre nearly equal in height that of the Mexicana. Ascending the great northern quebrada, termed the Escaleras, or ladder, from its long continued ascent by ravines and terraces, to the bases of the central elevations, a distance of 12 leagues from the trapeche or mill of the Escaleras is traversed. The region of lichens and mosses is finally arrived at in the upper ravines; and here the central elevations rise steeply, and often inaccessibly, from 700 or 800 to 1500 feet. This is the region of the condors, which, when glutted with the carcase of some dead mule, may be easily approached. Here also I observed a small active quadruped resembling the fox, scaling the rocks above the region of vegetation. At the northern edge of the Valletos occurs the *Cueva de Perez*, whence a ravine branches off to the right to the base of the Mexicana, which here presents a broad and very steep face, about 1000 feet in height, on which huts and entrances to mines may be seen at various elevations. A little way up the ravine from the cave some ancient Indian mining works exist; and here the *puna* begins to be sensibly felt, increasing as the ravine is ascended. At the entrance of this northern gorge of the Famatina mountains, near the Escaleras mill, long dikes, piled up, of smooth, rounded, bright gra-

nitic stones and flat beds of similar stones and boulders alternating with patches of sand, exhibit striking evidences of the force of aqueous action. Further in the ascent the features of the scene are on a grand scale. A mountain stream, from 15 to 50 feet wide, and from 2 to 4 deep, descends through this section of the mountains to the mill of the Escaleras, and is several times crossed in the ascent; it then flows into the valley below, and irrigates the district of Famatina already described. The pass of the Escaleras is generally impassable during the winter months of June and July, the stream frozen, and the ravines blocked with snow and ice. I, however, succeeded, in the comparatively milder winter of 1826, though not without difficulty, in ascending by this route and gaining the summit of the Mexicana, having passed a night in the Cueva de Perez blocked round with snow during one of those terrific storms so common in these elevated ranges. Their approach is well known to the miners, from the gathering of masses of small dark clouds sweeping eastward over the Nevado; the arriero with his mules, to or from the mines, then hastens to gain shelter in the huts above, or in the deep ravine beneath. These storms come always from the westward or south-westward: they sweep the ravines with furious gusts, which are succeeded by sudden momentary calms: they are generally confined to the upper regions of the mountains, without being felt at all in the valley of Famatina, where the weather may be serene and fine. The roofs of the low massive huts at the mines on the hill side, notwithstanding their being heavily laden with large stones, are sometimes blown away. In this remote and stormy region the poor miners lead a wretched existence: the spirit of gain, however, seems to set all difficulties at defiance. The highest part of the summit of the Mexicana, forming a point slightly elevated above the rest, called the *Espina*, is cut by a vein of silver ore which for several years has yielded a profit to its proprietor, D. Simon Herera, although worked at enormous expense. About 70 men were engaged in the working of this mine, and reducing the ores by amalgamation at the trapeche of Escaleras, distant 40 miles from the mine. Another vein in the same elevation has been profitably worked by Senor Goriti; and there is also another mine, which has been badly worked, in which considerable quantities of rich ore are exposed to sight in the vein. The ore of this elevation is a black, or greyish-black earthy sulphuret of silver, either pure, or more or less dispersed in a quartzose and hornstone gangue, and containing a proportion of gold sufficient to give the silver produced a yellow tinge. The average produce of the silver is 80 marks the cajon of 50 quintals from the mine of Santo Tomas in the *Espina* above mentioned. The other mines of this elevation yield an average from 40 to 50

marks, with the exception of that of D. Isidore Carbajal, which yielded 25 marks. There is probably considerable waste in the reduction of the ores. An assay, by a skilful German assayer, of some of the *relaves*, or refuse of Santo Tomas, which had undergone amalgamation at the trapeche of the Escaleras, yielded in the ratio of 30 marks the cajon. The ores of this mine became latterly interrupted by a bed of pyrites. The veins of the Mexicana dip to the N.E. at an angle of about 70° to 75°; the dip of the veins in the other elevations ranges between 50° and 80°. The inclemency of this region of the Mexicana is excessive; so much so, that the endurance even of the Indian is put to the test. The other elevations more remote from the Nevado are more tolerable, the Morado being the mildest. Pleurisy often occurs, and the victim not unfrequently dies on the route during his conveyance to the valley. "*Padecemos, mas sufrimos,*"—"We suffer, but we endure," was their reply to my question respecting the climate of this region. This inclemency is, however, not attributable to the degree of cold merely, but to the increased nervous sensibility, occasioned by the action of the puna affecting both the respiration and digestion, and rendering the cold less endurable. The puna is produced not altogether by atmospheric tenuity, although its action may be aided by this circumstance, since it occurs in widely different degrees at similar altitudes in these mountains. In the Morado its effects are comparatively slight—in the Mexicana extreme, although the altitudes differ little or nothing in relation to this phenomenon, which, I have little doubt, arises from certain mineral exhalations. This circumstance may account for some travellers having denied or thrown doubt upon its existence (vide Miers and others), while others relate of it the most startling examples (vide Miller's *Memoirs*, and the older voyagers in South America). The puna is not to be mistaken: it ordinarily produces a sense of weight in the head and limbs, hinders the progress of the pedestrian, as if his heels were lead, and sets him panting at a common walk, as if he were running a race; when considerable, it produces headache and nausea; when extreme, vertigo and vomiting. The complexion of the fresh-coloured European changes to a livid bluish tint; that of the Indian to a cadaverous yellow. In the Himalaya mountains a similar effect has been noticed; the cause is probably identical. The Mexicana exhales profusely sulphurous and other vapours: the clothes of the visitor at the mines become saturated with the effluvia, and it is probably as much owing to the puna as to any other natural obstacles that the Nevado is as yet unexplored, although conjectured to be rich in the precious metals. I suffered severely from passing a night in a low hut, half filled with snow, near the

summit of the Mexicana, with nothing but my saddle and its usual accompaniments, and a blanket for my bed, although the previous night I had slept on the rocks of the lower summits in the pass of Santa Rosa in the open air, with snow around me, with but little inconvenience comparatively—so much more inclement was the Mexicana. On this account no native visits it from mere curiosity.

Most of the ores of silver—the vitreous and other sulphurets, the muriate, red silver (*rosicler*) and native silver, in gangues varying from the hard quartzose to the slaty argillaceous, and the blending of both with iron-spar and the oxydes of iron—occur in the other elevations above named in these mountains; with the exception of those of the Morado, in which no silver ore has yet been discovered. As far as at present ascertained, the mineral veins of this range are limited to the central regions in the neighbourhood of the Nevado, and do not extend to the minor elevations of the range on the south, nor to those grouped on the N. E. and N. W. in the early portion of the ascent of the Escaleras. No mineral veins have been discovered in the range of La Rioja. On the Cerro Negro there is a mine—that of San Domingo, in which native silver, interspersed with the sulphurets, has been found in considerable quantity. I saw among other rich specimens, a piece of ore from this mine, extracted during my residence at Famatina, weighing above 20 pounds, three-fourths or more of the whole mass being native silver, imbedded with rich sulphuret, but presenting an almost uniform metallic granulated surface. The mines above mentioned, with some in the Rosario, now filled with water, but requiring only a small adit of a few yards to carry it off, are, as well as those in the Morado, in the hands of natives, and have never been under European management; the Famatina company of 1825 having, from various causes which it is unnecessary here to enter upon, been virtually rather one of exploration for new discoveries, than for the development of those already made. It would, therefore, notwithstanding the failure of that company—for which many extraneous reasons might be assigned, be presumptuous to say what future explorations, in connexion with the principal existing veins, might produce, or what undiscovered treasures might yet be brought to light, particularly should the Nevado itself be found accessible in some of its aspects. No disappointments have as yet been encountered, but such as have occurred in other mineral localities with equal title to consign them to oblivion.

Westward of the great Famatina chain lies the valley of Guandacol, which gives its name to the fourth and last department of the province of La Rioja. Its length may be stated at 35 leagues north and south; westward it extends to the foot of

the Cordillera. The inhabitants are for the most part of Indian origin. The river Bermejo, a considerable stream, rising in the Andes, flows through the whole district, the soil of which seems especially suited to the growth of wheat, for which, however, owing to the difficulties of communication, and the use of maize in the more central provinces, there is but slight comparative demand. No finer wheat than that of Guandacol, nor greater average produce—it has yielded 200 fold—is perhaps anywhere to be instanced, afforded by merely the scratching of a rude plough, and by irrigation. It is not, I believe, positively ascertained whether the Bermejo flows into the lake of Guanacache, or whether it be absorbed in the intervening Travesia between the Llanos of La Rioja and the habitable portion of San Juan. Copper, of which I have seen smelted specimens, is worked at Guandacol; but demand is wanting. The transit across the Andes to Coquimbo and Copiapó is comparatively easily accomplished by mules at this point. Merchandize was brought by this route to Famatina, in 1827; but the expense of exporting copper would probably be too great to render it, with this view, an object of production. The Indians of Guandacol hunt the vicuña, both for its flesh and fur; the latter is soft and fine, and is manufactured into ponchos and hats. A considerable number of cattle are reared in the farms, among the low hills of Guandacol northward; but, as already stated, the chief supply for the province is from the department of the Llanos.

In conclusion, I would observe that the most remarkable feature of the central plains of La Plata south of Tucuman, and bordering on the Cordovese range, as in those of San Juan, is the great scarcity of water and the total absence of the grasses over vast regions, and particularly of the kinds fit for cattle. Over tracts, wooded and unwooded, 50 leagues in extent, not a blade of grass is to be met with. With the exception of a portion of the plain in the immediate vicinity of Serrezuela, in the Cordovese chain, which is well furnished with coarse pasture, and in the neighbourhood of a spot called Balde de Nabor, the well of Nabor, about 6 leagues north of Serrezuela, in the Travesia, there is no known permanent grass or water to be met with over a distance of more than 40 leagues north from Serrezuela, and for a still greater distance east, from the line of the Rioja chain, comprehending a surface of more than 166 square leagues. I have stated how small a supply of it is to be found in the habitable portions of Arauco and Famatina. Those parts of the Llanos where grass and water are found form, as I have observed, but solitary specks, which again cede to the Travesia, including Salinas, between its south-eastern point,

Simbolar, and the Serrezuela; and between its south-western limit and the habitable portion of San Juan, 30 leagues of Travesia, a continuation south-westward of the former, again occur. The distinguishing feature of the wooded and grassless portion of the plains of San Juan, La Rioja, Catamarca, and Santiago del Estero is aridness. In some parts of the Travesias rain has been known not to fall for 18 months. Dew, which on the Chilian side of the Andes is abundant, is here unknown. The slight humidity afforded by the general state of the atmosphere appears to be drawn off towards this great saline desert, and absorbed by that and by the minor salinas, which thus exhaust the atmospheric moisture, so as to render unproductive of grass regions possessing a soil favourable for its growth. The salinas are almost the only places in which, under ordinary circumstances any moisture is apparent, and in these vegetation becomes extinguished by the excess of nitrous and muriatic salts, with the exception of a few scattered saline and alkaline shrubs.

Post Stations from the Town of La Rioja to the City of Cordova; through the western range of the Cordovese mountains:—this route was twice travelled by the writer.

	Post leagues.
From the town of La Rioja, through the first Travesia, to Hedionda	32
Polco	6
La Cienega	4
Simbolar—old road through the woods of Mimosas, &c.	8
Serrezuela, through second Travesia	24
Paso Viejo, entrance to western branch of the Cordovese chain	6
Soto	7
Poblacion, mountain road	4
Vallecito, ditto	7
Ayanpitin (Indian word, signifying "death is arrested.")	4
Matar Caballo, ditto, a fine level track over a mountain plain, covered with dwarf herbage	4
Quebrada, ditto, first post south side of the Cuesta	7
Saldan, Tablado of Cordova, a wooded and picturesque road	3
City of Cordova	4
	120

[On examining the meteorological register kept at Chilecito in lat. 28° 52′ S., near the centre of the Famatina valley, during the years 1827-8, it appears that the maximum height of the barometer was 27·5 in.; minimum, 26·45 in.; mean height 26·8 in.; indicating an elevation of about 3000 feet above the sea. During nearly two years' residence in this valley, the lofty summit of the Nevado was never entirely free from snow; in the great heats of summer the snow-line was about 200 feet below the summit. Now the limit of perpetual snow, in the parallel of 29°, is stated by Humboldt (*Pers. Narr.*, vol. i. p. 265) at about 12,000 feet; and we shall probably not be far wrong in assuming this as the approximate elevation above the sea of the summit of the Nevado of Famatina.—ED.]

XVIII.—*Some Notes on the Route from Cordova to Mendoza in 1837.* By Capt. Gosselman, of the Swedish Navy.

Having some years ago visited both North and South America, the Swedish government charged me with a mission to all the South American republics in 1836.—The greater number of high roads in that country are now tolerably well known, but, as I chanced to travel by a route from Cordova to Mendoza, that has not appeared hitherto on any map, I have great pleasure in submitting my notes to the Geographical Society; and I do this with more gratification from the opportunity it affords me of publicly expressing my thanks for the civility I have invariably met with from the officers of the British navy in command of ships on the South American station.

Quitting Buenos Ayres I travelled by the usual road to Cordova. This town, lying at the eastern foot of an isolated mountain-chain in the midst of the Pampas, is noted for its delicious figs and grapes, and its clear cold water—its Alameda is the finest in South America, and its university was once celebrated. From Cordova the road runs south for ten miles along the foot of the mountains, which are close on the right to a small hamlet named Durazno; thence it turns S.W. ten miles to a neat town of 3000 inhabitants named Alta Gracia. Proceeding in the same direction, at 5 miles we crossed the river Aniscato, probably a branch of the Rio Segundo, and at 10 miles beyond reached the large farm of Manzana, situated at the south-eastern foot of the mountains, which we now begin to ascend in a westerly direction for 5 miles, to the village of Yriartes, seated on the eastern edge of an elevated plain, across which we travelled S.W. 10 miles to a small stream, and again ascended a range of mountains, which here extends in a N. and S. direction, and reached their summit, which may be estimated at 2000 feet above the western plains. From this point a rapid and wild descent in a S.S.W. direction brought us to the picturesque and beautiful Valle del Nono, and to the hamlet of Ormillo, seated to the westward of a small stream which waters this well-wooded valley, and causes great fertility and a proportionate population. Continuing to the S.S.W. we crossed a considerable stream here called the Rio de los Sauces, and 8 miles beyond reached the hamlet of Las Liebres. Crossing another considerable stream, the Rio Quinto, running to the S.S.E., we again gradually entered on the vast level plain or Pampa—the striking feature of this part of South America—and successively pass the farms of Rancheria and Manantial, about 20 miles apart—and between which no water is to be had; here the plain now becomes arid and sandy, and the few pools have brackish water—nought to relieve the eye but an occasional stunted algarobo-tree, and not uncommonly the cattle perish for want of water. About 40 miles from

the Rio Quinto two remarkable hills, named El Gigante, or the Giant, rise abruptly from the plain to the height of about 500 feet: at the entrance of a narrow valley which lies between them is the village of Portezuela or "little gate." These hills are said to contain gold. 20 miles beyond, the traveller crosses the wide bed of a river called the Desaguadero or "outlet," but which in summer is always dried up: on its right or western bank are two houses bearing the high-sounding name of Alto Grande, and from this spot the glorious range of the snowy peaks of the Cordillera of the Andes, still at the distance of 160 miles, becomes distinctly visible, forming a striking contrast to the flat Pampa which apparently stretches on a dead level to their base. From Alto Grande the road turns due west. At 40 miles is the village of Val de Juanito, surrounded by more wood than had been visible in the whole extent of the last 100 miles; 45 miles farther lies the large and populous village of San Martin—consisting of a row of well-kept farms divided by double alleys of poplars, and abundantly watered; this place, whose name does not appear on any map, contains 2000 inhabitants, and is in a very thriving condition. Three leagues beyond we crossed the river of Mendoza, and from thence 8 leagues through a marshy country bring the traveller to his welcome resting-place in the beautiful city of Mendoza—the Montpellier of South America. Crossing the Cordillera by the pass of Uspallata, I traversed Chile, embarked at Valparaiso, sailed down the coast to Guayaquil; thence ascending over the eastern shoulder of Chimborazo, leaving its peak and that of Cariguairazo on the left, Condorate and El Altar on the right, and with Tunguragua in front, I crossed the famous suspension bridge, the Puente del Penipe—visited the village of Los Baños; the waterfall of Agoyan; Ambato, with its 12,000 inhabitants; Latacunga with 10,000, and where all the houses are built of pumice-stone; Callo, a house said to have existed from the time of the Incas, and placed at the foot of the snowy peak of the Cotopaxi: to Quito, Popayan,—the sources of the Magdalena,—and reached Santa Fé de Bogotá on the 1st December, 1838.

[The accompanying map contains Captain Gosselman's route; and the opportunity has been taken to lay down also that of the late Lieut. Hibbert, R.N., from San Juan to the Cordovese mountains, in 1821, no account of which—having been printed only for the use of his private friends—has been before given to the public, though it was the *first* journey, we believe, performed by any Englishman across the Pampas, of which any account has been printed, and is inferior to none which have since appeared in interest. It was performed under very trying circumstances, and for the most part over country untrodden and quite unknown even to this day. Indeed, both these routes cross a considerable track undescribed as yet by any but themselves.]

XIX.—*A Visit to the Sinjár Hills in 1838, with some account of the Sect of Yezídís, and of various places in the Mesopotamian Desert, between the Rivers Tigris and Khábúr.* By Frederick Forbes, Esq., M.A., of the Bombay Medical Staff.

In the end of September, 1838, being at Mósul, on my way from India, I considered that it would be a good opportunity to visit the Sinjár hills, concerning which nothing has hitherto been known with any certainty, travellers having always been deterred from the attempt by the ferocious character of the Yezídís who inhabit them, and who, until last year, kept the whole of the country between Mósul and Nisíbín in a constant state of alarm. Their depredations at length became so frequent and extensive, that Háfiz, Pásha of Diyár-Bekr, was compelled to attack them, as the only means of preventing a great part of his Páshálik from becoming a desert. He collected a large force of the Nizámí Jedíd, and, after an obstinate resistance and considerable loss, succeeded in overcoming them, took possession of all their villages in succession, and made the population tributary to the Sultán, leaving a governor, or musellim, to watch over them, but permitting them to retain their own religion, laws, and customs. The danger of venturing among them being thus much diminished, and the only risk being in crossing the desert, which is here infested by the powerful tribe of 'Anezeh Arabs, I applied to Mohammed, Páshá of Mósul, for an order or recommendation to the musellim and chiefs of the villages at Sinjár, to afford me an opportunity of visiting the hills and remaining there for a short time. The Páshá (to whom I had a letter from Colonel Taylor, the political resident for Turkish Arabia) promised his assistance; but, after waiting a considerable time at Mósul, he appeared averse to my going there, and put me off from day to day with trifling excuses. At last I sent to one of the principal Sheïkhs, or Yezídí priests, at the village of Ba'áshekhah, near the foot of Mount Maklúb, who having agreed to accompany me to Sinjár on receiving an order from the Páshá to that effect, came to Mósul, and having after some delay procured the necessary permission, we prepared for the journey.

Oct. 12.—Left Mósul* at 3 P.M., and keeping N.W. with the Tigris a mile to the right, over a country pretty extensively cultivated, although the soil was almost hidden by loose stones, approached in 1½ hour the bank of the river, opposite the Muselmán village of Reshídíyah, and soon after passed the village of Shírah, or Sírej Khán, also on the opposite bank, and inhabited by Musellim. At 5 h. 10 m. reached our halting-place,

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* Properly, Mauṣil.

the wretched village of Ahmeïdát, consisting of about a dozen Arab hovels, situated on a high precipitous bank overhanging the river, in the centre of which there is a large island, and the half-ruined village of Menkúbah, on the opposite or north bank.

Oct. 13.—At 3 h. 30 m. A.M., left Ahmeïdát by a narrow and difficult path in the face of the high bank of the river. The chain of islands here is 3 miles in length, and is formed by a division of the Tigris into two main streams, of which the western is the smallest: these are connected in several places by smaller branches. Passed several copious springs issuing from the bottom of the bank, a few feet only from the water's edge, one of them impregnated with sulphur. At 4 h. 30 m., the road left the river, which here inclines to the northward, and led across a rather flat country, having a range of low hillocks on either side, the distance between them being about 12 miles, the ground undulating and slightly clothed with dry grass and thorny shrubs. At 7 h. 10 m., passed the deserted and ruined village of Khurbet Lubghi-llah, and at 8 h. 15 m. halted for ten minutes near another deserted village called Dó[illegible]bíyah, the plain having how become more level and open. In many places the remains of water-courses built of stone run across the road, showing that the plain was formerly cultivated. At noon passed the ruined village of Abú Marrí, near which is a most abundant spring of brackish water forming a small brook, which is, however, soon lost in the reedy hollows. Soon after leaving Abú Marrí, the road joined another from Eskí Mósul, and at 2 h. 40 m. we reached the town of Til A'far.

Til A'far, the only inhabited place in the desert between Mósul and Sinjár, is a singular looking town, and appears to be of great antiquity. It consists of four divisions of considerable size, situated on as many steep and rugged hills of limestone rock, rising about 200 feet above the plain. The quarter built on the highest of these was at one time surrounded by a wall which is now quite in ruins; from the base of this hill a copious stream of water issues, forming a large rivulet, which runs through the ravine in the middle of the town, but is completely exhausted, in the course of a mile or two, in watering the neighbouring gardens. The water is very hard and bitter, but at its source swarms with fish. It turns several mills, which, though of the rudest construction, are rarely to be met with in this country. The number of houses in Til A'far is about 1000, of which 700 are now inhabited; they are substantially built of stone and mortar, with flat roofs made of clay and chopped straw. The soft limestone rock on which the town stands is so pure and abundant, that they have only to kindle a fire of dung and straw over a spot of ground, and scrape off the crust of quick-lime when it cools. There are a great many covered reservoirs for preserving rain-water, but they seldom can collect more than sufficient

for three months' consumption. There is no bázár or market-place in the town, and only a few shops, such as those of the tobacconist, blacksmith, carpenter, and dyer; the latter is the only Christian inhabitant, all the others being Mohammedans, a mixture of Arabs and Kurds. The language generally spoken is Kurd, but Arabic is also commonly understood. The gardens in the vicinity of the town, which owe their existence to the rivulet above mentioned, are planted with fig, pomegranate, and mulberry trees, and contain a few vegetables, such as parsnips, radishes, beans, and the bámiyah, or *Hibiscus Esculentus*. To the eastward, as far as Abu Marri, the whole plain is annually cultivated in the cold season, although, from the strong and barren appearance of the soil, the fertility cannot be great; the crops raised are wheat, barley, and a trifling quantity of cotton. Til A'far was formerly governed by a Chief or Aghá, chosen from among the inhabitants by themselves, and nominally appointed by the Páshá of Baghdád, but was in reality always quite independent of the Turks, and the resort of all the robbers in the country, who joined both with the Arabs and the Yezídís of Sinjár in plundering caravans. After Háfiz Páshá had subdued Sinjár, he took possession of Til A'far, and it is now governed by a Turkish Zábit (governor), appointed by him, and pays an annual tribute of 150 purses, of 500 Constantinople piastres each, or nearly 745*l*. The chief employment of the inhabitants is agriculture, such as it is; a little coarse cotton and woollen cloth is also made; but since their old trade of robbery has been put a stop to, they have not acquired industrious habits. Til A'far is 12 hours, or 42 miles from Mósul, 6 hours from Eski Mósul, and 35 miles from the Sinjár hills.* About 20 years ago, when a building called the Castle, which was on the highest of the four hills on which the town is built, fell down, there was found among the rubbish a great number of written papers (or dafters,† as they were called in Kurd and Persian), which, from the description given of them, must have been ancient manuscripts; they were in rolls of from 30 to 40 feet in length, and in a character which none of the inhabitants had ever before seen or could understand. They were unfortunately all burnt, or otherwise destroyed at the time, and, notwithstanding the most diligent search, I did not succeed in finding any of them.

While at Til A'far, I was exceedingly desirous of visiting the ruins of Hatra or Al Hadhr, which were distant only two days' journey in a southerly direction; but without an escort of Arabs from that neighbourhood, it would have been useless to attempt

* With strong mules, lightly laden, and on the good and level roads of Mesopotamia, the rate of travelling often exceeded 4 miles an hour, and on a long journey the average was fully 3½ miles.

† A list, account, or muster roll, from the Greek διφθέρα.

it, and I distrusted my strength, being reduced to a state of extreme weakness by constant attacks of fever. None of the people of Til A'far would undertake the journey; and even had they done so, it would have been questionable policy to have trusted them, as they are looked upon, even by the worst of the Arabs and Yezídís, as a nest of the most treacherous villains in the country. Mr. Ross, the residency surgeon at Baghdád, has, however, visited Hatra twice (having been seized the first time by the Arabs, but released by some of them who had known him in Baghdád), and carefully examined the whole of the ruins, of which he has many plans and drawings. These, along with a great mass of information respecting parts hitherto unexplored both in Kurdistán and Al Jezírah, the course of the Nahrewán, the situation and extent of the Sidd Nemrúd, or Median Wall, &c., have been probably communicated ere now to the Bombay Geographical Society.

After remaining a day at Til A'far, during which time my companion Sheikh 'Ali was in a constant state of alarm, we contrived to procure a couple of mules, as the Súrují (muleteer) had the strictest orders from the Páshá not to venture beyond Til A'far with the post-horses which brought us from Mósul. Set out at 4 o'clock on the morning of the 15th, and keeping W. by N. across the plain, passed at 6 h. 30 m. a ruined village called Jubbárah by the Kurds, and 'Umrah by the Arabs, close to which is a small stream of water, soon lost, like the others, in reedy hollows. At 7 h. 45 m. halted on the bank of a small brook which was formed by a spring close by, and lost after a course of about a mile and a half to the S.E. At 8 again proceeded, the southern extreme of the Sinjár hills being W. ½ N. At 9 h. 15 m. commenced the gentle ascent of a range of low hills which surrounds the base of the higher ones, and soon after passed a pond or tank of brackish water, bordered by gigantic reeds, some of them being upwards of 20 feet in height.

At noon crossed a small rivulet of good water, but of no great length, and began to descend towards the base of the inner and higher hills, passing several marshy ravines covered with reeds: the soil here appeared pretty good but very stony. At 2 P.M. reached some cultivated fields belonging to Bukrah, the nearest Yezídí village in the hills. For a distance of 5 miles from that place are the remains of cultivation all along the path, but very few of the fields appeared to have been lately tilled. The different fields are divided and the road bordered on either side by low stone walls, all the stones gathered from the ground being collected into large heaps. Proceeding along the base of some low hills, at 3h. 10m. turned suddenly to the S.W., and perceived the village of Bukrah, situated some distance up the steep face of

the mountain, and surrounded by plantations of fig-trees. After a difficult ascent of 20m, we reached the village, and were conducted to the house of the chief; crowds of Yezídís surrounding the priest Sheïkh 'Alí and kissing his hands with great appearance of respect. The house we were brought to looked particularly neat and clean, and the villagers, although very inquisitive as to the object of my visit, civil and attentive. As every European travelling in the East is supposed, as a matter of course, to be a physician, numerous applications for advice and medicine were soon made. 'Amrú, the chief of the village, was in great tribulation on account of a demand for tribute made on him by the Musellim, who resides at another village about 5 miles distant, and which he protested he was unable to pay. Next day a Kawwás or messenger arrived from Mírzá, Páshá of Márdín, who acts as Vakíl or agent for Háfiz, Páshá of Díyár Bekr, in collecting the tribute. The sum required was only 250 chirkhlís of Baghdád, or about 6*l.* 10*s.*, and this 'Amrú declared he could not give. After an incessant dispute kept up till midnight by the people of the village, who had assembled in the chief's house, and all took part in the discussion, the messenger departed without having obtained the money, and no sooner was he gone than they began to curse and abuse both him and the Páshá without mercy. The village of Bukrah, consisting of 65 houses, or about 500 inhabitants, is pleasantly situated on the north-eastern shoulder of the mountain, near the point of junction of an outer low range of hills with the higher and precipitous inner one. It is built on a very steep declivity, the houses rising in rows above one another. The whole side of the hill, to the very summit, is covered with vineyards and fig-gardens, to the extent of several miles on either side of the village. All the cultivated ground is laid out in flat narrow terraces, supported by low stone walls in order to prevent the scanty soil from being washed away by the rains. Water is procured from wells at the base of the hill about a mile from the village, and near the border of the plain, where there is a considerable tract of wheat and barley. Between these fields and the village a large piece of ground is laid out in threshing-floors, by being well levelled, spread with stiff clay rammed close and hard, and surrounded by low stone walls: the grain is here cleaned from the husk and winnowed.

Oct. 16.—Ascended the mountain above the village by a very steep and winding track, leading between huge masses of rocks and scattered plantations of figs and vines. In 1¼ hour reached the summit, which is here about 1600 feet above the plain, and had a very extensive view of the great plain of Mesopotamia with the elevated chain of Mount Masius on the horizon. From hence the shrine of Sheïkh Rúmí, a Yezídí place of pilgrimage, bore

N.W., distant 10 miles in the desert. The fig-gardens and vineyards reach to the very top of the hill; a small variety of fig is produced here, about the size of a gooseberry, of a peculiarly rich and luscious flavour. A large species of thistle, the fennel plant, and a shrubby bay grow in great abundance on the hill.

Oct. 18.—Left Bukrah to visit the villages on the south-eastern part of the hill, being obliged to ride on asses, as not a single horse or mule was to be procured. Set out at 8h. 20m. A.M., by a very bad road, leading through the valley between the outer and inner hills, and lined on either side by fig plantations; the soil being for the most part very thin and scanty, with large blocks of stone projecting from it in every direction. Our course was first E.N.E., having the base of the outer hills 1½ mile to the northward. At 9h. 50m. course S.E., and at 10h. 20m. S., at 11h. S.W., and at 11h 30m. reached the village of Mírká, after passing through 8 miles of cultivated ground. For the last 3 miles before we reached Mírká the hills consist entirely of argillaceous rock, much of it in a softened and splintered state. In many places in the steep face of the hill, the upper stratum of rock, which is from 1½ foot to 2 feet thick, exactly resembles a gigantic pavement, being rent as if by art, into almost perfect parallelograms, some of them 20 feet in length by 3 or 4 in breadth. Mírká consists of three separate villages, about ½ a mile distant from one another: of these, however, one is completely ruined and deserted, another very small, and the third and largest to the westward only half inhabited; the three together consist of about 150 houses or 1200 persons. The fig-gardens here are not so extensive as at Bukrah; they are a good way to the N.E. of the village and run up in narrow patches to the top of the hill. We halted at the house of the chief, who happened to be absent, but his son, a lad of 13, did the duty of host in having food prepared for us. At 3 P.M. left Mírká, and proceeded due W., by a steep and rugged path, over low hills; at 3h. 15m. passed the small village of Hallejá, containing only ten inhabited houses, built on the steep face of a hill and surrounded by ruins. At 3h. 30m. W.S.W.; at 3h. 50m. passed the ruined village of Tát, about 1½ mile high up the hill to the right. At 4h. 10m. reached the ruined and deserted village of Teppah. From a small ravine, at the bottom of the rising ground on which it is situated, issue four springs, distant from 10 to 20 paces from each other, and furnishing such an abundant supply of water as to form a considerable stream, named the Sáluk, which runs with a rapid current to the S.W., and waters a large tract of cultivated ground, where they raise crops of wheat, barley, and cotton: after a course of 30 miles it is lost in the desert; the water is very pure and good. Between Hallejá and Teppah the hills rise in very singular crescent-shaped

ranges above one another, the apices pointing to the N.W. At 4h. 20m. course W.N.W.; at 4h. 30m. the path we followed joined the road from Til A'far to Sinjár, near the ruins of a water-mill; at 5h. we reached the village of Sinjár, and were conducted to the house of Hasan, the chief, who gave us a very hospitable reception.

Sinjár, as it is called by the Arabs, or Singálí by the Kurds and Yezídís, was at one time the largest town or village here, and gives its name to the neighbouring hills. What now remains of it, perhaps 80 houses, is situated on a small hill at the base of the mountain and edge of the desert: it formerly, however, when inhabited by Mohammedans, occupied a much greater space than at present, as is evident from the extensive ruins in the plain below. In a ravine, between the inhabited portion and a mass of ruined houses on another small hill to the westward, are three very copious springs close to one another, forming a stream of some size, which irrigates an extensive space of cultivated ground in the plain, and after a southerly course of 13 or 14 miles is lost in the desert. Over the two largest of the springs, which are only 40 yards from each other, are the remains of a very old arched building, flanked by round towers with a gate in the centre; the whole strongly resembling the Roman style of architecture. In the plain below the town are the ruins of many Mohammedan buildings, and the tombs of several Sheikhs and holy men. The most remarkable of these is part of a fine minaret of yellow brick, of very beautiful proportions, but only 40 feet of the base now remain. It is of an octagonal form, and under the doorway, which is 20 feet, or half the height of the ruin from the ground, an old Arabic inscription, on large square blocks of brick, forms a band which runs round the building, but so much corroded by time and the action of the weather as to be illegible. The style of the shaft resembles that of the time of the earlier Khalifs. On the top of a small hill, close to the town, is the tomb of a Mohammedan Sittí, or lady of rank, called by the people here Bint 'Alí, or the daughter of Imám 'Alí; but who this Imám 'Alí was, or when he lived, I could not ascertain: it is of some antiquity, and several parts of the interior are handsomely executed in grey marble, but the inscriptions are very much defaced. When Sinjár was attacked by Háfiz Páshá, a great part of the town was burnt and destroyed, and has not since been rebuilt. There are a considerable number of Mohammedans residing here. We left Sinjár in the forenoon on our return to Bukrah, and reached that village at sunset, having halted for a short time at Mírká. Between Bukrah and Mírká, and about 3½ miles from the former, is a ravine at some distance from the road, high up the hill, in

which are the remains of what is said to have been a Deïr, or Christian monastery; but it is now so utterly ruined as to render it impossible to judge what sort of a building it has been.

Oct. 20.—At 4 P.M. left Bukrah, and keeping to the westward, through a continued plantation of fig-trees, passed at 4h. 10m. the village of Nuksí, almost entirely ruined, containing the tombs of two Yezídí Sheïkhs and fifteen inhabited houses. At 4h. 30m. passed the village of Yúsufah, of twenty-five houses, and close to it that of Keïchkah, of sixteen houses. At 5h. 10m. reached the village of Gundágaïli, in which is the Mezár or tomb of another Yezídí saint, with many ruined and about twenty inhabited houses: 5h. 25m. passed Kushtánah, also consisting of twenty houses, and at 5h. 30m. Háldínah, rather a larger village, with about twenty-five houses. At 5h. 35m. we reached the united villages of Nógrí and 'Amr, in the latter of which we halted at the house of the chief, who, we found, had gone on a visit to Sheïkh Sufúgh, the head of the powerful Arab tribe of 'Anezeh, who was encamped in the desert about 30 miles off, in the direction of Nisíbín. These united villages contain about ninety houses, or about 700 inhabitants. In the evening we paid a visit to the Turkish Musellim, or Zábit, Táhir Aghá, who resides here with a few Turkish attendants, in order to collect the tribute for Háfiz Páshá. He received me very kindly, and invited me to breakfast with him next day, but expressed himself unable to understand the reason of my coming.

Oct. 21.—Had a visit from the Zábit in the morning, and after breakfasting with him at his house, set out at 12h. 10m. for the village of Kirsí. The path led due W. between the outer and inner hills, through a continued belt of fig-gardens, which ran quite up to the summits of the latter. At 2h. the fig-gardens ended, as did also the outer low range of hills; the plain reaching up to the base of the mountain, which is clothed with dwarf oaks to the top, the tomb of Sheïkh Rúmí bearing N., distant 8 miles in the desert, and surrounded by a grove of bay-trees. The hills now became lower, and more rugged and rocky, but thickly covered with shrubs and oaks. At 2h. 30m. another low range or belt of outer hills commenced, and we passed many large ravines opening on the road from the mountain, into which they generally lead in a southerly direction. At 3h. 30m., after having entered a large ravine or pass, leading to the southward, we reached the village of Kirsí, consisting of about thirty houses in two portions, one on each side of the valley, with a small stream of water running between them. We were conducted to the house of the chief, whose name was Muttú, a thievish-looking fellow of forty years of age, who had lost an arm from a wound, and had

his face and body covered with scars, received, according to his own account, in battle with the 'Anezeh Arabs, but which he more probably got when robbing some caravan.

His house consisted merely of an open shed, with a roof of sticks and leaves: he received us, however, kindly enough, and his wife soon brought us a good supper. Although this was the most miserable-looking village in the hills, the people were much less inquisitive than usual, and treated us with great hospitality: they sat up till midnight round a large fire, smoking, and singing a kind of lament for the taking of Sinjár, in which the name of Háfiz Páshá was introduced at the end of every verse. While coming to-day from 'Amr to Kirsí our guides were much alarmed by some parties of 'Anezeh Arabs seen about the skirts of the hills, and we could scarcely prevail on them to proceed. We heard also that the Arabs had plundered a caravan and killed some people on the road between Til A'far and Bukrah the day after we had passed.

Oct. 22.—At 7h. 15m., A.M., left Kirsí to ascend to the source of the stream which runs through the village. After a ride of half an hour along the bank, and up a pretty steep ascent, passing the ruins of two large water-mills, which had been strongly and neatly built of stone, we arrived at a most beautiful spot in the ravine, thickly planted with pomegranate-trees, the stream hidden by large willows, and the hills on each side covered with oaks to their summits. On passing this we entered a thick oak copse reaching down to the banks of the stream, which were bordered by fine willow and poplar trees interlaced with brambles and the wild rose. The path now became so rugged that we were obliged to dismount. At 8h. 45m. we reached the source of the stream, which flows clear and plentiful from an arched channel, in a small level space under a high precipice, on the top of which is situated the village of Kolghá. The surrounding rocks are thickly covered with oak, jujube, and bay-trees, and higher up the hill to the southward and westward the oak forest is so thick that the ground cannot be seen. On a large rock near the spring is a sculptured niche, 3 feet in length and 1 broad, with a basin-shaped hollow at the bottom, a few inches in depth, the face of the rock being smoothed on each side to the extent of several feet. The Yezídis know nothing of the origin or use of this niche and basin, and say that it is of a date previous to their time: if the tradition they have here be true, that the hills were formerly inhabited by Christians, (as the ruins of the Deïr or monastery near Bukrah seem to prove,) it would appear probable that this had been a place of baptism. Above the spring the ravine opens out into a wide valley between the hills, which is cultivated by the villagers of Kolghá. From the spring we ascended

by a steep and circuitous path to the village, where they forced us to stay and eat: an old woman, a sister of Sheïkh 'Alí, who is married to the chief of the place, amused us by pretending to convert acorns into pieces of sugar. Kolgha consists of about fifteen houses: there is a good deal of cultivation about the village, and large flocks of goats, but no fig-gardens. From hence we descended to Kirsí by a shorter and steeper path at some distance from the stream. In the evening I learned from Sheïkh 'Alí that the attack on the caravan, in which a brother of Colonel Taylor, the resident at Baghdád, and another English traveller were killed some years ago, was made by a united party of the inhabitants of Bukrah and Til A'far, and that their deaths were entirely owing to their having made resistance and shot one of the Yezídis. Kirsí is a miserable place, with very little cultivation about it: there are some fig-gardens high up the hill, but they raise only a little tobacco about the village, though the soil is pretty good. If the villagers had any industry they might live very comfortably; but, as is often the case, the idlest are placed on one of the best spots. On asking them why they did not make cloth or 'abbás, or tan leather with the oak-bark and acorns, or even build better houses and till their fields, Sheïkh 'Alí said, "Do you see that hill opposite the village? Before Háfiz Páshá came here, the whole employment of the people of Kirsí was to sit on the top of it all day, looking out for travellers and caravans, in order to plunder them: now that this is at an end, they have nothing to do."

Oct. 23.—Left Kirsí at 8 A.M., and after passing down the ravine to the northward, kept in a westerly direction along the base of the hill, with a small belt of low hills, from ¼ to ½ a mile broad, to the right. At 8h. 45m. passed the ruined village of Rauzah 'Ashúr, or the garden of 'Ashúr, which, instead of having an appearance befitting its name, is the most barren-looking spot that can be imagined. From hence the high land above Nisíbín bore N. by W. across the desert: at 9h. 25m. passed a large ravine leading into the hill in a southerly direction, in which is situated the ruined village of Deríjá, and at 9h. 30m. passed the extensive ruins of Khálik, with a scanty stream of water running down the valley below them. The hill is here low, bare, and rocky, sprinkled with a few stunted oaks; the plain is abundantly covered with dry grass, and much frequented by herds of wild boars, which resort from the neighbouring heights to the pools of water in which the brook terminates. At 10h. passed the small ruined village of Tírán or Tíráni, the outer hills having now become lower and broader. At 10h. 30m. passed a large ravine leading into the hill; at 11h. the fig-garden and village of Jifrí, containing about 40 houses, and halted ¼ of an hour after for

10 minutes at a well in the valley below; at 12h. 40m. we arrived at Samúkhah, and were conducted to the house of Shummú the chief. From the mouth of the ravine in which Samúkhah is situated the village and lake of Khátúníyah bore W.N.W., distant about 12 miles. The village of Samúkhah has nearly the largest population of any in the hills; it consists of 130 houses or about 1000 persons; its fig-gardens extend close to Jifrí, a distance of 4½ miles, and also a great way up the sides of the mountain. There is no spring nor stream near it, but abundance of water is always procurable from wells dug in and near the village. I was asked by many of the people here to write charms for them against danger and sickness, and by the old women for others to ensure the quick and happy marriage of their daughters. The charms which they sometimes procure from some Mohammedan Sheikh or Sayyid, or in fact any one who can write, are scraps of paper containing short sentences in Arabic, and a few titles of God taken from the Korán; these are inclosed in a small silver case, or sewn up in a piece of silk or cloth, and worn round the arm.

Oct. 24.—At 9h. 20m. A.M. left Samúkhah for Sakíníyah, a village situated on the south-western side of the hills, but instead of making a circuit all round the western end, we kept up the valley of Samúkhah, at first in an easterly direction, ascending by a very steep path through extensive fig-gardens. At 10h. 15m. course S.S.W. through a thick oak forest; at 10h. 30m. S., and at 10h. 40m. reached the summit of the hill, and began to descend on the other side by so rugged and stony a path as to be almost impassable; the fields of Sakíníyah appearing like a small patch of green on the edge of the plain immediately below us. The whole of the southern aspect of the hill is bare and rocky, and no oaks grow on it; they terminate at the summit, which is here about 1500 feet above the plain, but there are a great many hawthorn and bay-trees scattered in the hollows and ravines. At 12h. 15m. reached the village of Sakíníyah, a miserable-looking place, half in ruins the huts badly built, most of them being formed of loose stone walls covered by black tents pitched over them, and may contain about 350 inhabitants. There are some small fig-gardens on the heights to the eastward, and a considerable extent of cultivated ground in the plain about a mile from the village, watered by a small brook which issues from a spring at the base of the lower hills. Sakíníyah is 9 hours from Sinjár, and 8 from Samúkhah by the circuitous path around the base of the hill on the W.S.W., part of which is the ruined village of Shillú, and 1½ hour to the W. of Samúkhah that of Bárah, in the N.W. corner. The small stream which rises near Sakíníyah is lost in the desert after a course of a few miles. Having halted

for two hours, we returned to Samúkhah, which we reached before sunset.

Oct. 28.—Having visited all the villages and other places worthy of notice in the hills, and procured with difficulty mules to carry us to Nisíbín, distant about 80 miles, I paid the priest Sheïkh 'Alí for his assistance as my guide the sum agreed on, and left Samúkhah two hours before daybreak, accompanied by Shummú, the chief, and three men armed with swords and matchlocks; but we had only proceeded about 5 miles, when we met a small caravan from Nisíbín, the people of which informed Shummú that a man in the service of Mirzá Páshá, with whom he was on bad terms, was on the road seizing mules for the use of the troops, and that his would certainly be taken on account of the quarrel between them. On hearing this he turned back, notwithstanding all I could say to the contrary, and we dismounted again at Samúkhah at 9 o'clock. After some delay and trouble I procured other mules and men, and Sheïkh 'Alí having volunteered to accompany me to Nisíbín, we again set out at 2 P.M., and having passed some fields under the village, proceeded N.N.W. through a pretty level plain like that between Til A'far and Bukrah, slightly clothed with grass and prickly plants, interspersed with a small blue and white crocus. At 2h. 30m. the hill of 'Abd al 'Azíz, near Róhá, bore W. by N. At 3h. 30m., course N.N.W., the eastern extreme of the Sinjár Hills bearing due E., and the western end W.S.W. ¼ W. At 6h. 50m., course N. by E., extremes of the hills S.W. ¼ W. and E.S.E. ½ S. At 7h. 20m. passed a deserted 'Anezeh encampment, on the borders of a small hollow containing some shallow pits and wells nearly dry. At 8 halted to feed the cattle, and at 9h. 20m. proceeded N. ½ E. At 10h. 30m. we were alarmed by a large body of Arabs, mounted on camels, crossing the road at full speed a few hundred yards in advance of us, and expected an attack; but they passed on without troubling us, although they had a clear view of our small party in the bright moonlight. The cold was very severe during the night, the thermometer being so low as 39°, with a strong northerly wind. At 11h. 30m. arrived at a piece of marshy ground covered with pools of water. From hence to the banks of a small, sluggish, reedy stream called the Hasáwí, which we reached at 1 A.M. of the 29th, the soil is soft, damp, and strongly impregnated with salt. The Hasáwí runs here to the S.W., but contains very little water; it rises from Mount Masius above 'Aznowár, and runs into the Khábúr. At 2h. 30m. we crossed it where the water was 2 feet deep, and halted on the opposite bank in a bed of reeds to try and get some sleep, which the cold and heavy dew effectually prevented.

Oct. 29.—At 5h. 30m. A.M. got up almost stiff with cold, and proceeded in the same direction as before. At 8h. 30m. came to a tract of marshy ground covered with long reeds and many large pools of water, there having been some heavy showers a few days before. The western extremity of the Sinjár mountains bore S.S.W., and the snow-covered summit of Jebel Júdí, where, according to Mohammedan tradition, the ark of Noah rested, and its remains still exist E.S.E. Báb-el-Márdín (the Gate of Márdín), a remarkable gap or notch in the chain of Mount Masius, behind which is situated the city of Márdín, bore due N. From hence we kept N.N.E. over a marshy plain, and along the E. bank of the Jakhjakhah or Nisíbín stream, the ancient Mygdonius, and after passing the small village of Howinah, consisting chiefly of tents, crossed the stream near the village of Haïnú, with some difficulty, on account of the depth of sand and mud, though there was but little water, the greater part of it being drawn off for the purpose of irrigation. Over the whole of the plain are scattered numerous conical hills, from 80 to 150 feet in height, which look like artificial mounds; they are regularly placed at distances of about a mile from one another. After crossing the Jakhjakhah we kept N. by W. through cultivated fields to the village of Koseïr, which we reached at 12h. 25m. and halted. From hence the eastern extreme of the Sinjár mountains bore S.E. ¼ S., and the western S. by W. At 4 P.M. left Koseïr and kept N. by W. across the plain through fields and water-courses, and after passing three small villages entered Nisíbín at 6h. 30m., and procured from the Zábit a kónák (lodging) in the house of a respectable Muselmán. No sooner had I discharged the mules and men who had come with me from Samúkhah than they were pressed by the Turks to carry stones and brick for some new buildings. Mírzá Páshá of Márdín, lieutenant of Háfiz Páshá of Diyár Bekr, was here on a tour of inspection.

Scarcely a year ago Nisíbín contained only thirty houses, built of sun-dried bricks, and almost deserted on account of the depredations of the Arabs; but, after the attack on Sinjár, a regiment of cavalry and a troop of artillery were permanently stationed here; they number at present 900 men, 500 of whom are lodged in the Kasr (castle) or palace, a strong and commodious building, and the remainder encamped outside the village. Since this force has been here, and the neighbouring country is secured from the attacks of the Arabs, the place has increased wonderfully, and now contains about a hundred well-built houses, and a dozen shops kept by Christians. The ancient church of St. James, in which there is a fine marble sarcophagus, is converted

into a storehouse for chopped straw, with which it is filled to the roof.

A short sketch may now be given of the appearance, habits, and customs of the Sinjárlís, commencing with an account of the general features of the country they inhabit.

The Sinjár hills are situated in the Mesopotamian desert between the rivers Tigris, Euphrates, and Khábúr, or Chaboras; the eastern extremity being about 83 miles from Mósul, and the western 70 from Nisíbín. The character of the desert is much the same both to the E. and W. of the range, being for the most part bare and unproductive, covered with coarse scanty grass and thorny shrubs, or consisting of extensive tracts of barren marshy soil, strongly impregnated with saline matter. To the southward of Mósul it is dry and sandy, but improves gradually towards Márdín, and that portion of the great plain of Mesopotamia, which lies in the direction of Kóch Hisár, equals, if it does not surpass in fertility, the richest soils in the world.

The mountainous district of Sinjár, which is in length about 50 and in breadth from 7 to 9 miles, with its narrowest end to the westward, has been variously divided, according to the situation of the different parts. The most general of these divisions is into Jinái and Khowárikí, as they are termed by the Arabs, or Jowáná and Khórkí, by the Yezídís. Jinái comprehends all the villages from Nógrí and 'Amr to Teppah inclusive, or the eastern and half the northern side of the hills. The Khowárikí includes the remaining portion of their circumference from Sinjár to Kirsí. Another very common division is into Shamálí or Gharbí, and Kiblí. By Shamálí or Gharbí (i. e. the northern or western), is meant that portion of the hills which lies between Bukrah and Bárah, a deserted village 1½ hour to the W. of Samúkhah, containing sixteen of the above-named villages, and by the Kiblí (or southern), that portion lying between Mírká and Shillú, which is 2 hours to the W. of Sakíniyah, and comprises nine villages.

In point of fertility and population the southern tract, called Kiblí, cannot bear comparison with the northern (Shamálí), which, although smallest in extent, contains the greatest number of inhabitants, and by far the largest extent of cultivated ground. From Mírká to Shillú the soil is dry and rocky, producing scanty crops of figs and grapes, but of a quality superior to what is raised in any other part of the hills; near the course of the Sinjár and Sáluk streams, however, considerable quantities of wheat, barley, and cotton, are cultivated. From Bukrah to 'Amr the fig-crops are chiefly attended to, and occupy entirely the sides of the hills: from 'Amr as far as Samúkhah, the oaks in a great measure replace the vine and fig, but only occupy the northern side of the

hill, and do not quite reach its summit. On the southern side not a single oak is to be seen, but many large bay and hawthorn trees are met with. Few of the oak-trees are of any great size: the largest grow in the most elevated positions: they produce great quantities of very large acorns, which afford a plentiful supply of food to the numerous herds of wild-boars which frequent the hills, and whose tracks cover the ground in every direction, the banks of the rivulet, near Kirsí, being completely ploughed up and puddled by them. The fig-trees bear fruit when 4 years old, and if the soil and situation be very good, in 3; they continue productive for 45 or 50 years, and many are seen 70 and 80 years old* still bearing fruit. The figs are all of the white variety, and, although of a small size, are considered finer than those grown in any other part of Al Jezírah or Kurdistán.

The inaccuracy of our maps as to the situation of Sinjár, the lake of Khátúníyah, and the course of the river Hólí,† is very great. That no stream, even a few miles in length, exists between Mósul and the northern or eastern sides of the Sinjár hills is perfectly certain; and the brooks arising from the various springs all run in their brief course towards the N.E., till they are lost in the desert. In advancing from S.E. to N.W. between the Sinjár hills and Karájah Tágh (Mount Masius), the first stream met with is the Hassáwí, which rises near 'Aznowár, and running to the S.W., joins the Jakhjakhah or Mygdonius. The Jakhjakhah rises from the hills behind Nisíbín, and falls into the Khábúr above the junction of that river with the Hólí, having previously received the Kókab,‡ which takes its source to the eastward of Márdín. The village and lake of Khátúníyah (which is said to be 2½ hours in length, and 1½ hour broad), are situated about 13 miles W.N.W. of Samúkhah. Rás-al 'Aïn, the source of the Khábúr, is 3 hours to the N.E. of the mountain of 'Abd-al-'Azíz,§ near Róhá, or O'rfah, a day's journey from Márdín, and 2 days from the lake of Khátúníyah; from hence the river runs till within 4 hours of Khátúníyah, where it is joined by the united streams of the Jakhjakhah and Kókab, and soon afterwards, by the Hólí;‖ it then turns to the S., and passes close to the western end of the Sinjár hills, in its course to the Euphrates. Two hours N.W. of Khátúníyah is the source of the Hólí, near a ruined village and mill: it runs a distance of 2 hours to the W.S.W. and falls into the Khábúr.

* A fig-tree, at Christchurch in Oxford, planted by the celebrated Pococke in the latter part of the seventeenth century, was still productive in the year 1807.—F.S.

† Haulí, i.e., variable, changeable; in the plural Hawálí, whence the Al Huali of Rennell's Map.—F.S.

‡ Properly Kaukab, i.e., Star.—F.S.

§ More correctly Rohá, see Geograph. Nubiens, p. 202, Arab. p. 283.

‖ Called Hól by the Kurds and Yezídís.

There seems to be no doubt that the Yezídís derive their origin and name from Yezíd, the son of Mo'áwíyah, the destroyer of the race of Alí; although it is said by some that they are descended from a saint or holy man, named Yezíd, who lived about the same time. I have been unable to discover the meaning or derivation of the word Dásiní or Duwásín, generally used as a common name for all classes of Yezídís. Besides those of Sinjár, or the Sinjárlís, there are great numbers of them in Kurdistán and near Mósul, especially in the districts of Júlámerk, 'Amádíyah, Jezírah Ibn Omar, and Zákhó; a good many are also found in the N.E. parts of the páshálik of Diyár Bekr. Those who inhabit 'Amádíyah are considered as the most noble, and are called Sheïkh-Khánlì: their chief is guardian of the tomb of Sheïkh 'Adí. The Sinjárlís have always been the most powerful tribe, and it is probable that they originally dwelt in Babylonia and Assyria; but being held in detestation by the Persians on account of the destruction of the house of 'Alí by Yezíd, and also detested by the Arabs as worshippers of the devil, they were driven into the strong and isolated hills of Sinjár, and the rugged mountains and defiles of Kurdistán.

The religion of the Yezídís, according to their own account, is a strange mixture of worship of the devil with the doctrine of the Magians, Mohammedans, and Christians; but among the inhabitants of Sinjár, religion, or religious ceremonies of any kind, appear to be merely nominal, and never practised, at least as far as I could see or learn. As reading or writing is quite unknown among them, and in a manner prohibited, their religion is only preserved by tradition, which varies among the different tribes, and affords very incorrect notions as to their creed. Their greatest saint and patron is Sheïkh 'Adí, who is supposed to have flourished about 500 years ago, and who is said to have written a sacred book, called 'Aswad,' or 'The Black,' containing their laws and precepts; but as none of their divines can read, and as the book has never been seen by any one, it is probable that they have invented this lie for the honour of their religion; since one cause of the great contempt in which they are held by Mohammedans, is their want of any written law. The first and most important principles of the Yezídís are, to propitiate the devil and secure his favour, and to support and defend themselves by the sword. They reject prayers and fasts, as Sheïkh Yezíd has obtained indulgences for them all, even to the end of the world, of which they were positively assured by Sheïkh 'Adí. They consider the devil as the chief agent in executing the will of God, and reverence Moses, Christ, and Mohammed, as well as the saints and prophets held in veneration by Christians and Muselmáns; believing that all these were more or less perfect incarnations of Satan.

They adore the sun as symbolical of Jesus Christ. They believe that there is an intermediate state of the soul after death, more or less happy according to the actions of the deceased during life; and that they will enter heaven at the last day with arms in their hands. They acknowledge as their head, and as the mediator in their quarrels, the guardian of the tomb of Sheïkh 'Adí, in the territory of the chief of 'Amádíyah. This Sheïkh must be of the race of Yezíd: he receives a portion of all their plunder; and has, as an assessor or adviser, another called Sheïkh Kúchuk, i. e. the little Sheïkh who is said to receive the direct revelations of the devil, and, on payment of a sum of money, delivers his oracular counsel to those who consult him, after a pretended sleep, with sometimes a delay of two or three nights: he is held in great estimation, and his orders are strictly followed.

The Yezídís who inhabit Kurdistán and the country to the E. of the Tigris practise various religious observances, of which the following are the most common. On the 10th day of the moon, in the month of August, they hold a meeting at the tomb of Sheïkh 'Adí, which lasts a day and a night, and at which all the married women and men assemble. After dark, the lights are extinguished, and they hold promiscuous intercourse till morning. Near Ba'áshekhah, which contains 70 houses of Yezídís, 40 of Mohammedans, and 30 of Christians, is a fountain where they offer sacrifices of sheep and goats, and hold festivals four times a year in honour of the devil. At the village of Sheïkh 'Adí is the figure of a peacock in brass, called 'Melik Táús (King Peacock), which is venerated as the emblem or representative of David and Solomon, to whom they offer sacrifices, and of whom there are images near the Melik Táús. The Sinjárlís are not circumcised, but the Yezídís of Kurdistán are said to practise circumcision on the eighth day after birth. The children are baptized when six or seven years old, but no prayers are used on that occasion. They have no fixed time or place for prayer or worship: they occasionally visit the Christian churches and monasteries, and present offerings there on account of recovery from sickness, or escape from danger; they also kiss the superior's hand.

The teachers or Sheïkhs have great influence, and pretend to insure the admission of a soul into heaven by a number of ridiculous ceremonies performed over the corpse. It is first placed on its feet; they then touch the neck and shoulders, and, with their palm stretched out, strike the right palm of the dead body, saying at the same time, "Ará behesht," *i. e.*, Away to Paradise! The Sheïkhs also pretend to cure the sick by imposition of hands. It is considered a great thing to obtain for a winding-sheet one of the old shirts or dresses of the guardian of 'Adí's Tomb. This, they believe, insures them a good place in the

other world. They give large sums of money for these shirts, or even pieces of them; and the Sheïkh sometimes presents one to a particular friend, as the greatest favour he can bestow. The spiritual directors are much respected by all classes of the people, who, when they meet them, kiss their right hand. They are distinguished for the most part by wearing a white turban and a black woollen cloak. The families of the holy men only intermarry with each other.

The Yezídís have, like all other barbarous tribes, many superstitious observances, some of which are peculiar to themselves. From the reverence paid to the Evil Spirit, they do not use in naming him any of the common epithets, as these are all more or less expressive of horror, contempt, or abomination; nor will they suffer them to be used in their presence. This is particularly the case with regard to the word Sheïtán, and all other words resembling it in sound, as Shatt, a river. Instead of using the word Sheïtán, they designate the devil as Sheïkh Ma'ázen, *i. e.*, the Exalted Doctor, or Chief: and in place of Shatt, they use the common Kurdish word A'vé ('Ab), or the Arabic Má, signifying water. Speaking of the Euphrates, they term it A'vé Ma'ázen, or Má al Kebír, *i. e.*, the Great Water, or simply El Forát; Ma'ázen being a corruption of the Arabic Mo'azzem. As the word La'net is often applied by Mohammedans to the devil, a common expression of the Persians, on meeting a Yezídí, being La'net bih Sheïtán, or Curses on the Devil, the Yezídís never use any word which consists of the same letters, as Na'l, a Horse-shoe, or Na'lbend, a Farrier. It is considered by them a great insult to spit in their presence, or to spit into the fire. They use nearly the same oaths as the Turks, Christians, and Jews indiscriminately; but that which to them is most binding is to swear by the Standard of Yezíd. They used formerly to dress in blue; but it is now considered an unlucky colour, and white only is worn.

The domestic manners of the Yezídís, and their customs in general, are very simple. Both men and women are of middle size, and have a clear complexion, with regular features, and black eyes and hair; their limbs being spare, muscular, and well proportioned. The hair is worn long, and the beard and whiskers kept close shorn; but they are prohibited from cutting or dressing their moustachios. The dress of the men consists of a long white cotton gown, and cotton drawers, a leathern girdle, a camel's-hair skullcap, with a piece of black or checked cotton tied round it, and sandals of raw hide. The women wear a long white cotton gown, with very long wide sleeves, which are thrown back over the shoulders, and tied round the waist: over this is put a strange-looking garment of black woollen, or sometimes of party-coloured

stuff. This covers the back part of the chest, and descends in two long narrow stripes or tails nearly to the ground; two narrow bands also come from behind forwards, and are fastened round the waist like a girdle. A quantity of white cotton cloth is rolled round the head in the shape of a pointed hood, and tied under the chin. The women do not, like the Mohammedans, conceal their faces, but go about their household concerns, and mix with the men as in European countries. This, however, is commonly done throughout Mesopotamia and Asia Minor, except in large cities. The houses of the Sinjárlís are generally low, with flat roofs, around the edges of which is piled, in the form of a parapet, their stock of firewood, withered leaves, and branches for heating their ovens. Their houses are very clean and comfortable, but awkwardly built of rough stone and mortar, neatly whitewashed in the inside; and the flat clay roofs are supported by pillars made of fig-trees. The walls of the apartments are full of small recesses like pigeon-holes, of every variety of shape, which are used for storing various small articles, and are at the same time ornamental. The floors are well made of stiff clay, with one or more basin-shaped cavities in them, to be used as hearths. The houses are generally very large, and are what may be called double; they often contain the whole family, from the great-grandfather down to the youngest descendant, with all their wives and children.

The chief articles of food used by all classes of the people are barley-bread, onions, and figs, or grapes, either fresh or dried, according to the season: wheaten bread is very rarely seen. The bread is slightly leavened and baked in ovens shaped like large earthen jars, which are heated by burning in them a quantity of fig-leaves and twigs, dried grass, or any other combustible. Their cakes are slightly wetted on one side, and stuck against the inner surface of the oven till sufficiently toasted. A very good and palatable broth is made of shelled wheat, a small kind of pulse called 'adis,* and the seeds of the sour pomegranate. Wheat coarsely bruised is boiled with butter and spices, and eaten in the same manner as rice: this dish is called burghúl, and is very common throughout Asia Minor and Kurdistán. Dried figs, stewed with róghan, or clarified butter, and onions, is a very favourite dish; it is also made with oil or sheep's fat. Several kinds of inspissated syrup are made from grapes and figs, and eaten along with bread. This syrup, as well as that made from the date, is called dibs, and with it a tough sweetmeat is made by adding barley-flour, and boiling it up; it is then rolled out quite thin. It is called zinj al faras, or jild al faras, *i. e.*, horse's hide, which it very much resembles in appearance. Animal food is

* Lentils, Ervum lens.—F.S.

very little used, owing to the scarcity of it: a camel is killed now and then in a village by one of the inhabitants in his turn, and distributed among the rest. Acorns* are eaten by those who live in the western end of the hills, but only in times of scarcity. Like Jews and Mohammedans they do not eat pork; but they freely eat the blood of sheep, goats, cows, and other animals. Of vegetables they appear to have none but the pumpkin, which they eat stewed with meat. They are passionately fond of tobacco; to obtain which they will part with anything. No kind of wine or spirituous liquor is drunk by them; their only beverage besides pure water being pomegranate-sherbet, and a sweet drink, made by infusing dried figs in boiling water. The men and women eat separately; the latter always in private. The character of the Yezídís is rather superior to that of their neighbours of Mesopotamia. They are brave, hospitable, and sober, faithful to their promise, and much attached to their native soil, but at the same time cruel and vindictive, considering their proper means of support to be robbery and theft: and they treat with great ferocity any unfortunate Mohammedans who fall into their power, especially Persians. They differ from the surrounding tribes in not being polygamists: they take only one wife, and generally marry at the age of sixteen or seventeen. All the different tribes of Kurdistán and Sinjár intermarry with each other.

The Sinjárlís have never been subject to any one ruler, each village being under the management of an hereditary chief, who derives, however, very little advantage from this circumstance. The amount of tribute exacted by the Turks varies according to the fertility or situation of the villages, and the manner of levying it also differs. The revenue paid by Sinjár is a tenth part of the whole produce, consisting of cotton, wheat, and barley, or a sum of money of equal value; and besides the village tax, the chiefs must contribute their share annually to defray the expenses of a certain number of swords, shields, matchlocks, mules, asses, and sheep, demanded by the Páshá. There is very little trade carried on from Sinjár: most of it consists in bartering dried figs and raisins, at Mósul or Nisíbín, for coarse cotton cloths or woollen cloaks, wheat, pulse, and tobacco. Manufactures they have none, if we except the making of a very trifling quantity of the coarsest cotton cloth, and a little soap, for their own use, of sheep's fat and an alkaline ley procured from the ashes of the saline plants of the desert. The money current in Mósul and Baghdád, and, in fact, money of every kind, passes here for much less than its nominal value. The cherkhlí of Baghdád is valued at only 2 Turkish kurúsh or piastres, instead of $2\frac{1}{2}$; and the Spanish

* Probably the sweet acorns of the Quercus ballota, so called by the Spaniards from the Arabic word Ballút, an acorn.—F. S.

dollar and old ghází of Constantinople, at 20 piastres each, or 4*s.* sterling.

In estimating the population of the Sinjár hills, it must be remembered that all the houses are of great size, and that each contains all the members of a family. Taking this into consideration, the average number of persons to a house may, I think, be very safely taken at eight; and I am convinced, from repeated observation, that this is not above the mark. The number of grown men in the village of Bukrah was stated by several persons at from 140 to 160, while the number of houses is sixty-five. At the rate of eight to a house, this would give 520 as the whole population; and at the rate of three women, children, or young people to every male adult, a total of 560. Taking, then, the average of eight to a house, the total number in the 776 inhabited houses in the hills will be 6208. Although the population of these hills has no doubt been much exaggerated by report—Garzoni, who had good opportunities of getting information, says they could muster at one time 6000 firelocks—still it must have far exceeded the present number, as is evident from the extent of land which has formerly been under cultivation, and from the fact that at least two-thirds of the houses are in ruins, and no less than nine large villages completely deserted.

		h.	m.
From Nisíbín to	Márdín	10	40
	Diyar Békr	18	10
	Ákir Ma'den	18	30
	Malátíyah	29	0
	Sívás	39	30
	Tókat*	16	50
	Amásiyah	18	0
	Sámsún	22	0
		172	40

Total distance from Nisíbín to Sámsún by the road I travelled 172h. 40m., which, at the rate of about 3 miles an hour, would give a distance of 520 miles.

I annex a list of villages in the district of Mósul, of which the following is a summary:—

Villages inhabited by	Mohammedans	131
	Yezídís	45
	Christians	8
	Christians and Mohammedans	10
	Christians and Yezídís	1
	Christians, Mohammedans and Yezídís	1
Villages ruined and deserted		80
		269

* The distance from Sívás to Tókat by the usual road is only 11 hours.

Itinerary from Móṣul to Sinjár, and thence to Niṣíbín.

[All bearings magnetic.]

Móṣul to Aḥmeïdat, on W. bank of Tigris, N.W.		7½ miles.
Dóla' biyah, N.W. 3½ miles . .	W.N.W.	12½
Abú Marrí	W.N.W.	12½
Til 'Afar	W.N.W.	9
Jubbárah	W. by N.	8½
Cross a stream flowing S.E. at		4
Rise of outer low hills		4½
Cross a small stream at		9½
Cultivation commences at		7
Buḳrah—village of 65 houses		5
		80

From Buḳrah rounding shoulder of hill E.N.E. . .		4½
Hallejá S.E. rounding to S., S.W., and W. .		6½
Tát W.S.W., ½ m. Teppah		¾
Sinjár, W.S.W. ½ m.	W.N.W.	2½
		11¼

Buḳrah to Samúkhah.—Nógrí and 'Amr, passing Nuksí, Yúsufah Keïchkah, Gúndagailí, Kushtanah, and Haldínah	W.	5
End of outer low hills		6
Hills begin again		2
Kirṣí		3½
Kauzah 'Ashúr		2½
Khálik		4
Jifrí		5
Samúkah		5
		33

Samúkhah to Niṣíbín.—N.N.W. 5 m.; N. by W. 12 m.; N. by E. 3½ m.; N. ½; E. 18; crossed the Hasáwí, flowing to S.W.; N. ½; E. 10½ m.; N.N.E. 12 m.; N. by W. 1½ m.; Niṣíbín, N. by W. 8½ m.——Total 71 miles.

[The statements contained in this instructive paper are strongly corroborated by another traveller, who, as the writer of it justly observes, had no ordinary opportunities of inquiring into the faith and practices of the Yezídís. Father Maurizio Garzoni, whose tract respecting them was printed at Berlin in 1807, with the Abbate Sestini's 'Viaggj e Opuscoli,' and translated into French by the celebrated De Sacy, who added it as an appendix, to M. Rousseau's 'Description du Pachalik de Bagdad,' published at Paris in 1809. Very copious extracts from M. Rousseau's work, and the Appendix concerning the Yezídís, are given in Mr. Buckingham's 'Travels in Mesopotamia,' pp. 116-121.—F. S.]

XX.—*On the Nile, and the present and former Levels of Egypt.* By Sir J. Gardner Wilkinson.

The nature and character of the Nile, and the peculiar laws which govern the land of Egypt, are questions which in all times have been looked upon with considerable interest. Numerous conjectures were formed by ancient writers respecting the probable cause of the inundation. Some attributed it to the continued force of the Etesian or annual winds, which, blowing from the northward during that season of the year, were supposed to check the course of the stream, and to occasion it to overflow—an opinion readily refuted by Herodotus;* others explained it by the melting of snow in the lofty mountain ranges of Ethiopia; and some were disposed to believe that periodical rains falling there accounted for this phenomenon.

Though the reasoning of Herodotus on the subject is not very philosophical, it is evident that he attributes the rise of the Nile to the rains which fall near its source—an opinion common, as Strabo informs us,† to many; and one that Homer, from his calling the river διιπετης, or "fallen from heaven," appears to have adopted. Modern discoveries have shown the truth of this conjecture; and as far as regards the course and sources of the Blue River, or eastern branch, and its tributary streams, our knowledge is tolerably accurate. The White River, its sources, and the extent of its course from its head until it joins the Blue River at Khartúm, in lat. 15° 38′, are still a desideratum; and the only part of the stream hitherto examined is a distance of 30 days' march above the junction. It is, however, to be hoped that a native of Ethiopia, lately sent from England for the purpose, will clear up this important question, and add to our geographical knowledge, by ascertaining the course and sources of the White River. That this last is the main stream is universally allowed by every one who has visited it, from Bruce to the present day: but the Blue River possesses a remarkable character, which connects it more closely with the inundation, and claims for it the merit of being the parent of the beneficial qualities of that river which spreads fertility throughout its course from Abyssinia to Egypt.

The White River brings no such alluvial deposit: the sandy soil of its banks is unsuited to many of the productions which flourish in the other branch; and though its additional stream, rising about the same time as the Blue River, tends to raise their combined waters over the lands they fertilise in their course northward, the Egyptian peasant has merely this debt of gratitude to acknowledge; and the prayers of a heathen husbandman might

* Herodot. ii. 20. † Strabo, xvii. p. 543.

be offered to the supposed god of the Abyssinian branch for the blessings of the inundation, without his being bound in duty to propitiate the presiding deity of its western companion. The Blue River has the same general character as that observable throughout the course of the Nile: its banks in Ethiopia and Egypt are formed of the same rich alluvial deposit brought from the mountains of Abyssinia; and the principal difference is in the greater thickness of the stratum left in the southern part of its course, in consequence of the heavier particles subsiding more quickly than those lighter ones which are carried onwards in its course to Egypt.

To give some idea of the manner in which the alluvial deposit takes place, and the changes it causes in the levels of the land, and in the bed of the river itself throughout its course, I must first observe that the bed of the Nile and the land of Egypt (to which country I shall now confine my remarks) undergo a gradual increase of elevation, varying in different places according to circumstances, and always lessening in proportion as the river approaches the sea. This increase of elevation in perpendicular height is much smaller in Lower than in Upper Egypt; and in the Delta it diminishes still more; so that, according to an approximate calculation, the land about Elephantine, or the first cataract, in lat. 24° 5′, has been raised 9 feet in 1700 years; at Thebes, in lat. 25° 43′, about 7 feet; and at Heliopolis and Cairo, in lat. 30°, about 5 feet 10 in At Rosetta, and the mouths of the Nile, in lat. 31° 30′, the diminution in the perpendicular thickness of the deposit is lessened in a much greater decreasing ratio than in the straitened valley of Central and Upper Egypt, owing to the great extent E. and W. over which the inundation spreads, and there the elevation of the land in the same period of 1700 years has been comparatively imperceptible. In like manner, the proportion between the increase at Elephantine and Thebes differs from that between Thebes and Heliopolis, because the breadth of the valley is greater below Thebes, and because the farther southward the more is the deposit. In one case, 1½° of latitude gives a difference of about 2 feet; in the other (from Thebes to Heliopolis) 4½° give a difference of only 1 foot 2 in.

Those arguments used to show the effects of the alluvial deposit in rapidly protruding the Delta into the sea, founded on the statement of Homer respecting the Isle of Pharos, will not, I trust, be again brought forward, since positive facts prove the limited progress made by the Delta from the earliest times of which any record exists, by the position of ancient cities, as Pelusium, Canopus, and others, whose sites are still in the vicinity of the sea-coast, but which, if any great protrusion of the land into the Mediterranean had actually taken place, ought at this time, after a lapse of between 3000 and 4000 years, to be far inland.

With regard to the statement of Homer,* that "the distance from the Isle of Pharos to Ægyptus was as much as a vessel with a fair wind could perform in one day," I have shown † that all arguments derived from it are inadmissible, in consequence of the situation of that island, and the nature of the ground on which Alexandria is built. That city stands on the rock of the Libyan Desert, which is still, as it ever was, above the reach of the inundation; and the breadth of the channel between the shore and the Isle of Pharos was in the days of Homer, and at every period, precisely the same. After the foundation of Alexandria, the island was united to the shore by an artificial dyke, called the Heptastadium; but, though this connected them, it did not bring the shore one foot nearer to the island, nor was any alluvial deposit the cause of the channel between them being closed. And now having shown that the deposit of the Nile had no power to advance the shore towards the Isle of Pharos, I beg to exculpate the poet from the imputation of a gross error, which might otherwise attach to his assertion, by observing that he uses the word Ægyptus to signify the Nile as well as the land of Egypt, which is fully explained by Diodorus,‡ who says that Nileus, one of the early monarchs, transferred his name to the stream, which previously bore that of Ægyptus; and Arrian § observes that "the river now called by the Egyptians and others Nile is shown by Homer to have been named Ægyptus, when he relates that Menelaus anchored his fleet at the mouth of the Ægyptus."|| It is, then, to the Nile, and not to the coast of Egypt, that the poet refers, when he speaks of the distance from Pharos to Ægyptus.

The opinion of Herodotus, and others, that the constant elevation of the land by the alluvial deposit would eventually prevent the inundation covering the lands, has been repeated even to a late time; and some have thought that all the predictions of famine made by the historian were on the eve of their fulfilment. The Nile, they say, formerly rose so high above the land, that Herodotus saw the villages during the inundation like the islands in the Ægean Sea: this ceases to be the case at present; and after some years it will no longer inundate the country at all. But this opinion is maintained by its authors, merely from their not having visited Egypt during a great rise of the river; while from my own experience, and that of others, I can attest that the same happens at the present day as in ancient times, whenever the inundation is of a certain height; for it is well known that in every age the Nile varied in its rise; and the deficiencies of one or two seasons were counterbalanced by a plentiful supply of water in

* Odyss. Δ, 355. † Manners and Customs of the Ancient Egyptians, vol. i. p. 7.
‡ Diodor. i. 63. § Arrian. Exped. Alex., 5 and 6.
|| Odyss. Δ, 477, and Ξ, 257.

another year. Writers who held this argument, and foretold such dreadful calamities to the unsuspecting inhabitants of Egypt, forgot to observe that the bed of the Nile always keeps pace with the elevation of the soil, and the proportion of water annually brought down by the river has always, and ever will be, the same; the only difference being, that it now overflows a greater extent of land E. and W. than in former times, and that the superficies of cultivable land in the broad plains of Central Egypt and the Thebaïd continues to increase.

In that part of Egypt lying to the S. of the Delta, the banks of the Nile are much more elevated than the land of the interior at a distance from the river, and they are seldom quite covered with water even during the highest inundations. Little, however, projects above the level of the stream, and in some places the peasant is obliged to keep out the water by temporary embankments. This may be accounted for partly by the continued cultivation of the banks, which being more conveniently situated for artificial irrigation, have a constant succession of crops; for it is known that tillage has the effect of raising land, from the accumulation of decayed vegetable substances, the addition of dressing, and other causes; and the greater depression of the plain in the interior is probably, in some degree, owing to the numerous channels in that direction, and to the effect of the currents which pass over it as the water covers the land. It must, however, be confessed that these causes are not sufficient to account for the great difference existing between the height of the bank and the land near the edge of the desert, which often varies as much as 12 and 15 feet, as may be seen from the respective heights of the dykes at those two points. These elevated roads, the sole mode of communication by land from one village to another during the inundation, commence on a level with the bank of the river, and, as they extend to the interior, rise to so great a height above the fields as to leave room for the construction of arches for the passage of the water, though, generally speaking, bridges are only built in those parts where ancient or modern canals have lowered the levels sufficiently to admit of them.

The general appearance of the dykes may be illustrated by No. 1 of the plate, in which A is the surface of the Nile during the inundation; B the level of the low Nile; C the bank; DD the raised dyke; E the beds of canals, over which bridges are built in the dyke; and F the *Hajer* or slope of the desert, extending from the junction of the irrigated land at H to the limestone mountains G. This section is given as if the dyke were in one straight line, E. and W. from the river; but in reality they follow a tortuous course, visiting the various towns on their way, and serving as roads, as well as an impediment to the arbitrary overflow

of the inundation. The direction of a dyke, varying according to circumstances, may be represented as in No. 2. It is on a plain of about 5 miles in breadth. Some dykes are much more circuitous and indirect even than this; but in all cases the principal care is to place them so as to oppose the greatest force to the largest body or pressure of water, and to offer the readiest means of communication from one village to another.

I have already observed that the deposit gradually raising the bed of the river, and the proportionate elevation of the water of the inundation, tend to increase the extent of the arable land of Egypt, and that there is now a larger tract of cultivable soil E. and W. from the river than at any previous period. This I shall endeavour to illustrate by a similar section, in which it will be seen that if the Nile, rising from its ancient bed, A B, No. 3, inundated the country in the direction and at the elevation E F, it would when raised to C D, its modern bed (the land being also raised in proportion to G), extend its inundation on the line G H to a far greater distance over the *Hajer* or slope of the desert, and give an additional tract of cultivable land from F to H. That this has actually taken place I have satisfactorily ascertained by excavations, and by observing the quantity of alluvial deposit accumulated round the base of ancient monuments, and by a comparison of the height to which the water now rises and formerly rose in the nilometer of Elephantine.

In the plain of Thebes are some colossal statues of Amunoph the Third, of which two still occupy their original site, and one of these has long been known under the name of the 'Vocal Memnon.' They stood on either side of the *dromos*, leading to a temple built by that Pharaoh, and at intervals, between them and the temple, were other colossi, statues, and tablets, long since thrown down or mutilated, and nearly covered by the alluvial deposits of the inundation. Their relative positions may be better understood from the plan No. 4 in the plate, where it will be seen that before the temple A are the tablets B C, and 420 feet beyond are the fragments of a colossus, E; then at a distance of 220 feet is another fallen colossus, G, and as a pendant to it a group of comparatively small figures cut out of a single block at F: the colossi H I, which are still standing, being 300 feet further forward, and appearing to terminate the dromos.

The temple is now surrounded by alluvial soil, and the water and mud of the inundation extend to the distance of 600 feet behind it. But when erected, about the year 1420 B.C., not only the body of the temple, but the dromos, or paved road leading to it, as well as the base of the colossi H I, were above the reach of the inundation, and the statues at F, which are still erect in their

original position, were exposed to view, though now buried to their waist in the alluvial deposit.

Indeed, I believe this dromos to have been a continuation of the "royal street," mentioned in some papyri found at Thebes, which, crossing the western portion of the city, communicated by means of a ferry with the temple of Luxor, founded by the same Amunoph, on the other side of the river; as the great dromos of Sphinxes, connecting the temples of Luxor and Karnak, formed the main street in the eastern district of Thebes.

The colossi H I are 47* feet high, with the pedestal, 60, but the alluvial deposit has accumulated around them to the height of from 6 ft. 10 in. to 7 feet, so that they now stand only 53 feet above the plain.† This was ascertained by excavating to the base of the pedestal; and having penetrated beneath it, I found that it stood, not on alluvial ground, but on the soil of the desert, which was paved with sandstone blocks, serving as substructions for the colossus and the dromos. The lower side of the pedestal had not been cut smooth, but was left of a round irregular shape, extending 3 ft. 10 inches below the level of the paved dromos; but that was of little importance, the main point was to ascertain whether the slope of the dromos corresponded with that of the desert; and this I proceeded to examine. I therefore dug to the base of what I supposed to be part of a similar colossus at F, 300 feet behind the colossus H, which, however, proved to be a group of statues,—a circumstance particularly fortunate for my purpose, as they were found to be standing erect in their original position. Their total height was 8 ft. 1 inch from the base to the top of the shoulder, the part above that being broken off; they projected 2 ft. 10 in. above the level of the alluvial deposit, so that it had accumulated in this part only 5 ft. 3 in. This satisfactorily settled the question I had in view, and gave in a distance of 300 feet a difference of 1·7 to 1·9, being an average of 20 inches in 300 feet, or a decreasing ratio of 1 inch in 15 feet, for the talus of the sloping desert plain on which they were placed.

According to this ratio the basement of the temple itself should stand very little below the level of the alluvial deposit, which indeed agrees with fact, though, as may be supposed, the slope of the desert is not quite so uniform as to accord with the mathematical calculation of an uninterrupted line. It suffices for our purpose to have ascertained that this gradual slope does exist, and that the colossi and the temple standing upon it are buried in

* By sextant I make the western colossus 47 feet, and the other, by actual measurement, 47 ft. 9 in.

† The ground has sunk at the base, and the statue inclines a little to one side, so that it is difficult to ascertain the exact height of the pedestal.

alluvial deposit in an inverse ratio as they approach the edge of the desert; and the only inference necessarily is, that the alluvial soil now reaches farther inland towards the desert than it did when these monuments were erected. We do not know how far the outermost colossi were at that time beyond the line of the alluvial deposit; the only conclusion is, that they were above its level, and that the dromos or paved street was also above the highest water-mark; though it is not possible to fix any exact point from which to calculate the annual increase of the perpendicular stratum of sand. Of this we may at least be certain, that all the deposit now existing between the colossi II I and the edge of the desert behind the temple, a total distance of 1900 feet, has been brought there since the reign of the third Amunoph, or within a period of 3260 years.

What has been said, I trust, fully demonstrates these propositions, that the perpendicular rise of the bed of the Nile extends the inundation and alluvial deposit much farther in a horizontal direction, E. and W., at the present day than at any previous period; that it has always continued to do so; and that, therefore, there is a wider extent of irrigated land now than in former times. I do not, however, pretend that the same quantity of land is cultivated as formerly; this must always depend on the population, the energies of the people, the system followed by the government, and other accidental circumstances; but it is not the fault of the river, nor from any deficiency in the benefits it used to bestow on the soil of Egypt, that much land is left fallow and overgrown with noxious weeds; and the modern inhabitants might profit by the same means of cultivating the edge of the desert by artificial irrigation as their predecessors, if Egypt only possessed the advantages of population, a favourable system of agriculture, and a wise government.

I have made the same observations respecting the extent of the land in other parts of Egypt, all confirming what I have stated, as might reasonably be expected, since the same causes necessarily produce the same effects; and I now proceed to show the origin of those erroneous notions which proclaim that the drifting sands have curtailed the limits of the arable land of Egypt, and that the desert, constantly encroaching on the soil, threatens to overwhelm the valley of the Nile, and already counteracts the beneficial effects of the inundation. In some parts of Egypt, as at Bahnasá, in latitude 38° 33′, at Kerdásí, a little to the N. of the Pyramids, at Werdán, still farther N., and a few other places, the sand of the Libyan desert has been drifted into the valley, and has encumbered the land with hillocks, spreading itself over the fields near the edge of the desert, and sometimes

burying trees and buildings to the depth of several feet. This has been particularly the case about Bahnasá; and Denon, who visited it, and witnessed the effect of the sand in that quarter, spread the alarm of its invasion, which has been magnified into the annihilation of the arable land of Egypt. But this evil is only partial; and, as Monsieur Regnier observes, in his Memoir upon the Agriculture of Egypt, published in the great French work,* "though many have spoken of the encroachments of the sand upon the cultivable soil, it appears to be much less considerable than is supposed; for otherwise many places indicated by ancient writers to have been on the borders of the desert would now be distant from the irrigated land, and the canal of Joseph, after so many ages of bad government, would have been long since filled up." In some places, he adds, this has happened, as at Werdan, in the province of Gizeh, where the sand has advanced to the distance of a league; but the position of the place, at the outlet of a gorge in the Libyan mountains, is perhaps partly the cause of this—an opinion which perfectly coincides with my own observation. In many places, where valleys open upon the plain, the sand is found to accumulate and sometimes to form drifts upon the land, which, when no precautions are taken, by planting the bushy tamarisk, increase so far as to prevent the overflow of the Nile from covering a portion of the previously irrigated soil; but these incursions of sand are only partial and in particular spots, bearing a very small proportion to the whole valley of Egypt; and it must be remembered that the desert, or gradual slope of the Hajer, between the limestone range and the arable land, is not a plain of moving sand, as some have imagined, but is composed of clay and stony ground, mixed with a proportion of sand, or an old detritus of the neighbouring rocks. On the eastern side of the valley very few sand-drifts are met with, except those seen from Cairo, beyond Heliopolis, and the Birket el Hájj on the Suez road; but these do not encroach upon the arable land, from which they are far distant; and since I have shown that on the western or Libyan side also the places where sand encumbers the land are partial, it may be readily imagined how slight an effect they must have compared with the whole extent of the country.

In the Delta, the only sandy places of consequence are here and there on the Libyan shore and on the coast of the Mediterranean, bearing an imperceptible proportion to the whole superfices of that province; and, indeed, the sand on the coast is not worthy of notice; nor can it be attributed in any way to the ad-

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* Mémoires sur l'Egypte, vol. iv. p. 5.

vance of the desert upon the land of Egypt. In many countries, as in France, about Dunkirk, the Landes and other places, as in Scotland, near Nairn, and in several parts of Europe, sand-drifts occur of great size and extent; but the same theories are not formed upon their aggressions; and we have in this a proof how far opinions are influenced by the name and by the idea of a desert. I am far from affirming that no encroachment of the sand takes place: my arguments are only intended to show that, taking into consideration the relative advance of the sand and of the alluvial deposit, the balance is greatly in favour of the latter, and the result is, that, whatever partial injury the sand may have in its power to inflict upon certain spots, the extent of the land is constantly increasing, and the number of square miles of arable soil is much greater now than at any previous period.

I must also make some remarks regarding the nature of the desert, which will be found to differ much from received opinion, as the simple mention of ranges of primitive mountains, reaching an elevation of several thousand feet, would suffice to show. I allude now to the desert lying between the Nile and Red Sea; but in order to give a just notion of the tract and the nature of the mountains in various parts, I must refer to my map, and to the accompanying sections in different latitudes.

The leading characteristic of this desert, particularly in the northern part, is its gradual ascent from the N. of the Nile to a certain distance eastward, where you arrive at a plain nearly level and of some extent, from which all the valleys or torrents running in a westerly direction empty themselves into the Nile, and those to the eastward into the Red Sea, following a descent in the opposite direction to the coast. This section, taken E. and W., about lat. 29° (see plate No. 7), will explain the appearance of the desert in that part.

The mountains there are all limestone; the ascent from the Nile to A is about 30 miles; the high plain A B is about 16 miles broad; and the descent then commences towards the Red Sea, which is about 50 miles distant.

In that part where the primitive range commences and joins the secondary hills, in lat. 28° 26′, the section E. and W. presents the appearance of *fig.* No. 8.

In lat. 28° 10′, passing by the lofty Ghárib, which is the highest peak in this desert, having an elevation of about 6000 feet, the section is of the nature as delineated in the plate *fig.* 9.

In lat. 28° from Jebel Ez-zeït in the Red Sea, to Jebel Abú Fáyidah the section has the character of *fig.* 10.

In lat. 27° crossing the great range of the Ummumfíyah, which is about 5000 feet high, the section has the appearance of *fig.* 11.

From a comparison of which it appears that this desert has one general character in its levels from the river to the Red Sea.

A little above Esneh, about lat. 25° 10′, the sandstones approach the Nile on the E. bank, and a little farther up they cross the river near Edfú, whence they continue on either side of the Nile; and at Silsilis are the quarries from which the sandstone used in the temples of Egypt was taken: 14 miles above Ombos, on the eastern bank, the granites appear, and at Eswan, 14 miles farther, they cross the river. Amidst these are the cataracts, a succession of rapids, of which no single fall is more than about 4 or 5 feet.

In Nubia the valley is very narrow, the rocks of the eastern and western mountains often coming close to the river and leaving little or no space for the deposit of alluvium; in other places on the Libyan side, the sand covers the whole level space between the hills and the bank, and the character of the country between the first and second cataract is totally different from Egypt. The river about Kalabsheh rises between 30 and 40 feet perpendicularly during the inundation, and, after it has subsided in February, the stream runs at the rate of 2 to 3 nautical miles an hour.—But I return to the deserts of Egypt.

In going to the western or Libyan desert in the direction of the Oasis Parva, one road passes by the Fayyúm. That province is considerably lower than the valley of the Nile, and the lake Mœris is about 100 or 120 feet below the level of the bank at Benisúef. A section across that part of the country, from the Nile to the mountain range lying behind the lake Mœris, has the form represented in *fig.* No. 12.

The hills A A are a continuation of the range B, as may be seen in a map of this district, from which it will also appear that on leaving the Fayyúm in a southerly direction, or in going from the Nile westward, you gradually ascend till you arrive at the summit of an elevated plain, which continues on a level, or with slight undulations, for a considerable distance, and forms the extensive table-land of this part of Africa. The Oasis and other valleys are depressions in this lofty plain; and, when you descend to them, you find the level space or plain of the Oasis similar to a portion of the valley of Egypt, surrounded by steep cliffs of limestone at some distance from the cultivated land, which vary in height in the different Oases. Those of the southern Oases are much higher, and consequently their level is much lower than of the Oasis Parva, as may be seen from the section No. 13, taken nearly N. and S.

From this it appears that the water of the Oasis Parva does not come directly from the Nile, and that we must look for the origin

of its springs from a more southerly point. The mountains of the high plain are limestone, the low plain of the Oases is sandstone on clay, and from this last the water rises, and by this it is retained. The limestone mountains of the Thebaïd rest in like manner on clay; and thus we may readily imagine that the water is conveyed from some point to the S. of greater elevation than the Oases, that its escape to the surface takes place wherever the limestone superstratum is removed, and that a continuation of the same bed of clay conducts it northward to the Oasis Parva, occasional opportunities being afforded it for rising, as at Faráfireh and other places on the way

Though I have represented the mountains as if the table-land of their summit were perfectly level, in order to show the comparative depressions of the Oases, it is not to be supposed that they are horizontal; if it were so, those of Lower Egypt would be more elevated than in the Thebaïd, which is far from being the case; the mountains of Thebes being 1200 feet above the Nile, which is a much greater elevation than any in the latitude of Cairo or the Pyramids.

From what has now been said it will be evident that the Oases are not fertile spots in the midst of a sandy plain, but depressions in the lofty table-land of Africa, where, by the removal of the superincumbent limestone strata, the water has the power of rising to the surface; nor is the desert a dreary plain of sand, as some have imagined, which has overwhelmed a once fertile country, whose only traces are the isolated gardens of the Oases.

XXI.—*Note accompanying a Survey of the Tigris between Ctesiphon and Mósul.* By Lieutenant H. Blosse Lynch, Indian Navy.

Baghdád, 25th July, 1839.

I have now the gratification to state that I have transmitted to Sir John C. Hobhouse, President of the India Board, a map of the Tigris between Ctesiphon and Mósul, which I trust he will allow to be communicated to the Geographical Society.

I must also mention what has been done, that none of your labourers may go over the same field. Chains of triangles connect Nineveh to Baghdád, Bághdád to Babylon, Babylon to Ctesiphon, Ctesiphon to Baghdád, and the mountains of Hamrín in two points, namely, where the Tigris bursts through them to the N., and Diyálah to the north-eastward; most of the prin-

cipal points within the range of these are fixed either by an extension of the trigonometric chains, or by latitudes and true bearings checked by longitudes; the great canals also have been touched by our work sufficiently to show us their direction and position.

As we work, the field, instead of being diminished, appears to extend; and I have been obliged to leave with regret the tracing of the splendid canals and rivers, and the filling in of the villages and ruins, for more favourable times. This, however, will be my first object—with the extension of our triangles along this river towards Basrah, and a careful survey of that part of the Euphrates between the Saklawíyah canal, and the lower part of what was Babylonia, to show the heads of the canals that run from it towards the Tigris, and once rendered it,—what its ruins attest, a splendid garden. The country between this and Mósul is one, or rather two, magnificent plains, being crossed by the low range of the Hamrín hills, which abut on the Tigris between Tekrít and the Lesser Zab. Everywhere ruins of forts and cities, canals and villages, are scattered over it, and in the valley of the river the richest alluvial soil abounds. The upper plain or country near and above the Hamrín may be called a prairie, high and undulating, with the range of the Karáchók hills, rising out of it far from the Tigris and cleft in the centre by the Zab. I am told the climate is delicious, except in the heats of summer, which are healthy, and when I have been strolling along the banks of the river it has been luxury to breathe.

There could be no difficulty in marching armies along these rivers in the present day; and I must confess I find more difficulty, the more I see of these countries, in reconciling the account of the Greek and Roman campaigns with the actual state of them —but more of this hereafter, as I hope to be on the Euphrates again next winter or in the spring.

[The map accompanying the above note is on the scale of 12 inches to a degree, from which, by permission of the President of the India Board, the map at p. 474 has been reduced.]

XXII.—*Notes on two Journeys from Baghdád to the Ruins of Al Hadhr, in Mesopotamia, in* 1836 *and* 1837. By John Ross, Esq., Surgeon to the British Residency at Baghdád.

After numerous failures for nearly two years, in endeavouring to get Bedwins to escort me to the ruins of Al Hadhr, I have at length succeeded in persuading Saláh-el-Mezeïní, a well-known Ajeïlí, to make the attempt. The ruins themselves and the country round them are looked upon by the Arabs with superstitious awe, as the haunts of evil spirits; moreover, the roads to them are always infested by plundering parties of the Shammár and Aneïzah, passing to and from forays; so Saláh determined to proceed with as few attendants and as little display as possible. I take two servants, and Saláh two Bedwins: we are all to ride horses except one, who rides the dhulúl or racing camel, carrying our small store of provisions.

May 7, 1836.—Our preparations being completed at 6h. 35m. A.M., we left western Baghdád by the Kádhimeïn gate. At 7h. 25m. entered, and in 10 min. had passed through, the village of Kádhimeïn, the bearing of which from the gate is about N.W. ½ N., but the road makes a considerable bend to get round a turn of the river. From Kádhimeïn we kept a winding course, in a general direction N.W. At 8h. we had Khiyát-el-Súk, or Isháki, close on our left: it is an aqueduct of great antiquity, said to leave the Tigris near Tekrít: I kept along in its bed, and could distinctly trace every branch given off by it. At 8h. 30m. came upon a large pool of water in its bed, from which were dug up, only last year, the remains of an ancient bridge, to build a house in Baghdád: the bridge was built of bricks, with cuneiform inscriptions, exactly similar to those of Babylon, and cemented with bitumen. From this point 'Aker Kúf bears S.W. by W. At 9h. 5m. the Isháki makes a slight turn to the left, and here the plain is covered with small mounds, broken bricks, and pottery. At 10h. 45m. came to the Isháki again, where it takes a similar turn and has the same indications; Kádhimeïn bearing S.S.E., 'Aker Kúf S.S.W., a mound called Tel Kheïr N. ½ E. Our course now nearly N.N.W. At 11h. 10m. passed a tel close on our right, and at 12h. 20m. P.M. came to another larger, from which Khán Suweïdíyah bore N.E. ½ E. We now kept a winding course between N.N.E. and N. At 1h. a small tel close on our right. Crossed three ancient canals in succession; and at 3h. 30m. halted at a sheet of water called Tarmíyah, of several miles in extent, occupying part of the Shat Aïdhá, or ancient bed of the Tigris, winding like that river, and of nearly the same breadth: the water is good and full of fish. At 3h. 40m. we again went on, the track winding between N. and N.W.

At 4h. 20m. we were crossing a plain covered with small tels, bricks, pottery, and intersected by dry canals. At 5h. got to the tomb of Sayyed Ibráhím on the top of an ancient tel. Sumeïchah of Dijeïl,* bearing N. ½ W., Sheïkh Jemíl E. ¾ N.; the ruins of Akbará and Wánah are seen extending N. and S. of Sheïkh Jemíl, but I am unable to make out their limits distinctly. We kept straight on for Sumeïchah, while Saláh, with a vast deal of gravity, let us all know the parts we were severally and jointly to act during the rest of the journey. I was to be a Turk going from 'Alí Pashá to Reshíd Páshá, and the Páshá of Mósul, and to be styled the Aghá: my servant, having the most untravelling name of Nicholas, was henceforward to be called Ibráhím; the rest would pass muster, Saláh being guide and protector of the party. At 5h. 15m. crossed a large branch from the old Dijeïl canal, now dry. At 6h. 10m. we had a huge mass of the ancient Dijeïl, ¼ of a mile on our right; and ½ an hour after we entered Sumeïchah, where we were instantly recognised and hospitably taken to the house of Jóhar Aghá, an Abyssinian, formerly belonging to Dáúd Páshá. I had frequently spoken to him at Baghdád about going to Al Hadhr, so he at once guessed our intentions, and all Saláh's machinations fell to the ground: he says our journey must fail, as the season is too late by a month, the waters of the Tharthar are salt, and the Arabs constantly crossing the country we intend going over. He seriously advised, and even entreated, us to give up all idea of going, and retrace our steps; but, like most good advice, his was thrown away.

Sumeïchah is still a very considerable village, surrounded with gardens of dates, oranges, apples, pears, vines, &c. &c.; the Dijeïl canal runs through it, and the adjacent country is well cultivated. In the time of Dáúd Páshá, before the great plague, it had four times the present population.

8*th*.—One of the Arabs, a young lad, and also his horse, are knocked up by yesterday's march and by Jóhar Aghá's account of the country, so I resolve to leave them here.

At 6h. 30m. A.M. started in a N.W. by N. direction, over hillocks and old canals; 7h. 25m. passed a saint's tomb, and at 7m. 30m. the ruined village of Wazan, leaving another ruined village called Bábilín close on our right. These two villages are said to have been, from time immemorial, inhabited by the descendants of the ancient people of Babylon after the final destruction of that city, and they were only a few years ago deserted by their inhabitants for Hillah and Kerbelá. It is as well here to mention that I have before seen the people in question during my visits to Hillah; they are called Bábilí, are Mohammedans, but are looked down upon by the Arabs; they intermarry with no

* More correctly Dujeil, the little Tigris.—F. S.

other people, and earn their living entirely by digging up bricks for building from the ruins of Babylon.

At 8h. 5m. we passed the tomb of an Imám, with a couple of date-trees near it. The country is now becoming very beautiful and green, being well watered by cuts from the Dijeïl. The Felláhs live in tents, and are now cutting the corn; in winter they all retire to the villages. At 8h. 40m. came upon the high bank of the ancient Dijeïl on our right: the modern Dijeïl flows in the centre of the old bed, taking up but a very small portion of it. On the opposite side is a square solid building of sun-dried bricks, apparently 20 or 30 yards in diameter. From the bank at this place Sumeïchah bears S.E. by S.; Beled N., and appears to be not much less than Sumeïchah; its gardens seem even more extensive. The ancient Dijeïl has here two beds: we kept along one of them N.N.W. to N.W., the country now getting stony, or rather pebbly. At 9h. 10m. passed the ruined village of Hamirát: the ruins are on both sides of the canal, which has a broken bridge over it. A little way to our left is a clump of curious trees called Shejerat-el-'Asl, or honey-trees: the Arabs say that they bear large yellow flowers, which contain a portion of sweet viscid matter like honey, and that they are the only ones of the kind known. We now kept along the modern canal, here about 20 feet broad: the banks are covered with small poplars and wild oats. At 10h. we got to the bridge of Harbah, a beautiful specimen of the architecture of the khaliphs. It crosses the ancient Dijeïl, and consists of four large arches, with a smaller one between every two,—in all seven: it is built of very fine reddish-yellow bricks, and has on each side for its whole length a large and very perfect single line of Cufic legend in high relief. Its length is 52 long paces, breadth 8½, with an expansion to 22 paces at each end. The parapet walls are so high, that a man on horseback cannot see over them. The ruins of Harbah, with the lofty broken shaft of a minaret, are close on the eastern side of the canal. The stream of the modern Dijeïl only takes up one of the arches.*

At 10h. 30m. A.M. left this fine ruin, keeping about W. by N. At 11h. 10m. came upon a very large ancient canal, running N.W. ½ W., giving off many branches: from the point at which we crossed, Khán Mizrákjí, on the eastern bank of the Tigris, bore N. ½ W. At 11h. 25m. saw a saint's tomb at a distance to the S.: we now kept nearly N.W. At 12h. 10m. P.M. crossed a large ancient canal running N. and S.: we continued in the bed of another ancient canal (I think the Isháki), much worn down. I now kept scouring along to the left and right, looking with much anxiety for the Median wall, and at 12h. 25m. had

* Mr. Ross's MS. is accompanied by a sketch of this bridge.

the great pleasure of standing on the top of it. It is called the Chalú, or Sídd Nimrúd, a solid straight single mound 25 long paces thick, with a bastion on its western face at every 55 paces, and on the same side it has a deep ditch 27 paces broad. The wall is here built of the small pebbles of the country, imbedded in cement of lime of great tenacity; it is from 35 to 40 feet in height, and runs in a straight line N.N.E. ¼ E. and S.S.W. ¼ W., in the latter direction as far as the eye can trace it. The Bedwins tell me it goes in the same straight line to two mounds called Ramelah, on the Euphrates, some hours above Felújah; that it is in places far inland built of brick, and in some parts worn down level with the desert. They say that it was built by Nimrúd (Nimrod) to keep off the people of Nínuwah (Nineveh), with whom he had an implacable feud. At this place is an opening or gateway, and on the western side of the ditch a square enclosed by a thick rampart, the Málawíyah at Sámarrah bearing N.N.W. ½ W., Harbah S.E. by E. From this spot I rode along the top of it half a mile to the Dijeïl, where every trace of it has been swept away by a háwí, or embayment of the Tigris; Khán Mizrákjí, a small tomb across the Dijeïl, here bore N.E. From this point we kept on our journey N.W., the country getting gradually higher and undulating, composed of pebbles and limestone. The rise was so sudden that in an hour after we saw the Dijeïl, nearly at the surface, we found it in a bed cut for it some 50 or 60 feet deep, through ground apparently as hard as iron. There are several old beds filled up, and the Arabs show the course of the Isḥáḳí, but it was too confused to be traced without a minute examination. The present bed of the Dijeïl was dug, I am told, only twenty or thirty years ago, by a certain Selím Beg; and I observed exposed in many parts of it sections of ancient brick walls. At 2h. 30m. got to the ruins of Isṭábolát: they are of considerable extent, showing broken houses built of both burnt and sun-dried bricks (the former cemented with lime) disposed in regular squares, with wide open streets crossing each other at right angles, the whole surrounded by a strong wall built of sun-dried bricks, with bastions and a fosse. Outside this appear several tepeh in confusion, probably a suburb. This is one of the most perfect and regular of the ancient ruins I have yet seen, and well worthy of a proper examination, which my present flying visit does not allow me to do. From the wall the mosque at Sámarrah bears N.W. ½ W.; Málawíyah, N. ½ W.; Gháïm N. ¼ E.

We went for some time longer over the high ground, and then descended to the river at Sherí'at-el-Ghazel, thence kept on in the háwí till 5h. P.M., when we halted close to the Tigris, opposite Sámarrah. We had just made ourselves comfortable, when

all at once a sudden and furious storm of rain and wind came on, completely deluging us.

9th.—Got up from out our bed of mud, and at 5h. A.M. started direct for 'A'shik N.N.W. ½ W., and reached it in an hour and a half. It is a square open building (with a projection from the N.E. front), built of the finest bricks in the splendid style of the era of the khaliphs; each side has six pilasters on square bases still standing to a considerable height, but most of the intermediate walls have tumbled down, giving the whole at a distance the appearance of a group of pillars. It stands on the high land, having the Isháki in the Wádí or valley of the Tigris close under it. From 'A'shik we kept along a straight mound or rampart in the hawí, our course about N.W. I observed several other mounds. At 7h. were opposite to the ruins of Shinás (on the eastern side of the Tigris), a ruin of the Mohammedan ages. At 7h. 30m. I rode up the high bank to look at a ruin, which appeared from a short distance to be a pyramid: I found it a solid mass, a portion of the wall of a square enclosure, evidently of great antiquity. It is about 25 feet high, formed of materials exactly similar to the Chalú and Gháïm, with the exception of having at intervals of several feet layers of very large red bricks. The walls are still 2 or 3 feet high. It is called Haweïsilát;* 'A'shik bearing S. by E., a mosque and minaret across the Tigris N.E. (seemingly a miniature copy of those at Sámarrah), called Minárat Ja'fer Abú Delif el Barmakí. We now kept off over the háwí, nearly N.N.W.: the Tigris here flows in a valley in many places 6, 8, and 10 miles broad, the projecting headlands forming embayments which are called háwís, and have a fine rich soil covered with grass and small tamarisks. The high land has now become rocky, apparently sandstone.

At 9h. 50m. reached Mehjar, a high mound of earth, with several small ones round about it, covered with broken bricks, pottery, and scoriæ, situated at the extremity of a projecting headland, close to the river and exactly opposite to the mouth of the Nahrawán. From the top 'A'shik bore S. by E., Dúr N.N.E. On a fine flat under the ruins was fought one of the most bloody battles the Arabs ever fought against Turks in these countries, when 'Omar, Páshá of Baghdád, with the 'Azzá and Al-'Abáïd Arabs, almost annihilated the great tribe of Majammah. One old man with us declares that even twenty years ago bones and rags of clothes belonging to the combatants were to be seen. From Mehjar we continued in a N. by W. direction across the largest háwí we have yet come to. Dúr, on the other side of the Tigris, looks a bare miserable place: the tomb of Imám Mohammed Dúr looks from here very much like that of Zobeïdah

* A sketch of this ruin by Mr. Ross is preserved in the library.

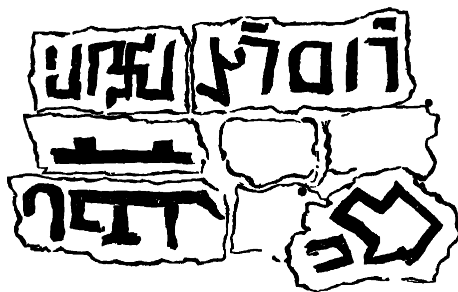
at Baghdád. 11h. 25m. passed a small tel, and turned N. along the Isháki, which has here only one bank. This mound and some *tels* in the vale, undoubtedly of very remote antiquity, prove that the háwís, in which the river flows above Sámarráh, must have been formed (whether by degrees or by some extraordinary rush of water) many ages before the Isháki was dug, while the embayments below Gháim, and in the alluvial soil, must be of much later date, as they have in many places swept away the Nahrawán, a work said by tradition, and with great probability, to be coeval with the Isháki. At 12h. 30m. got to Sherí'at-el-Wojá, and halted to rest under a large solitary mulberry-tree, called by way of distinction El-Túthá,* or The Mulberry.

All the háwís crossed in to-day's march were, till a few years back, cultivated by Arabs and the people of Tekrít, but when the Sahmmár Bedwíns were brought to Mesopotamia the cultivators were soon forced to fly. At this spot the river washes the high land and destroys every vestige of the Isháki.

At 1 P.M. we mounted, and, having ascended the high land, continued on our former course, over rough stony undulating ground, cut up by deep ravines, till we entered Tekrít at 2h. 20m. P.M., and halted. We were instantly known; but Saláh tells the people we are going to Mósul. The modern Tekrít, though consisting of a very considerable number of houses, and governed by a Beg, is scarcely worthy of being called a town. It is built on the cliff, and on the side of a deep ravine, and occupies the eastern part of the site of the ancient city, the ruins of which are very extensive. The ancient walls form a crescent with the cliff of about 1 mile in diameter, running into angles of every description, the intention of which I cannot imagine, the ground being quite flat; and these angles, instead of covering, frequently oppose each other. The ruins of the houses are easily traced, built of round stones in lime, the latter being the principal ingredient. At the southern end of the modern town is a confused pile of ruins, with low gates, called Kenísah, or church, and at the northern end stand the remains of the kalah, or citadel, on a hill detached from the town by a very deep ravine, in which water flowed from the Tigris, according to tradition, making the citadel an island: the eastern face is a steep rock washed by the river. The lower gate is, with part of a stair leading up, still perfect; as are also several buttresses. From the top of the Kal'ah, Dúr bears S.S.E.; Kantarah-el-Rebáb, on the river of Nahrawán, S. by E.; the Fakká', or passage of the Tigris, through the Hamrín hills, N. ¾ W. Outside the walls are many ruins and tombs of Mohammedan saints.

* Tút, not Túthá, is a mulberry; the latter is probably an ancient Chaldee name. —F.S.

Dread of the Bedwins, under Sufúk, last year obliged the inhabitants to dig a trench round the modern town; in doing which many buildings and subterraneous chambers were discovered, and also two large earthen vases, which I saw: one is plain, but the other, about 3 feet in height, has round it a border of griffins and human figures entwined by a rope: the execution, however, is very rude. Around the mouth are projections, with sockets and rings. It is made of brownish yellow clay, and is used to hold water by its owner, a certain holy Mullá Rejeb. I tried hard to get it; but nothing would induce the old man to part with it. In wandering about I observed in the wall of a house, built in at random, four brick fragments, bearing this in relief:—



The people of Tekrít are a most inhospitable set; we can scarcely get anything out of them in the way of provender; and, if I had not a Fermán with me, I believe we should get nothing at all. In the evening I found one of my best men, Sayyed Hindí, ill: he was thrown yesterday by a vicious horse, but did not feel it much till to-day.

10*th*.—After a vast deal of trouble and wrangling, we succeeded in procuring a few days' provision for ourselves and barley for the horses. We hire a donkey to carry the barley to Sherkát from people going with skins (for rafts) to Járah, for the purpose of floating bitumen to Baghdád. We also take with us a very old Bedwín, named Shi'ál, a servant of Fa'ad, the Shammár sheïkh. Saláh thinks he may be useful, and he is, moreover, a capital story-teller. At 2 P.M. we started, going along the high land, first N.N.W., then gradually turning round to N. At 4h. 20m. had an Imám's tomb at some distance on the right: kept now N.W. by N. At 4h. 45m. turned N. by W., crossing over deep ravines, then turned down one, on the left side of which is a large natural cave, often inhabited by travellers, as I see marks of fire in it. At 5h. 30m. turned right, down a deep ravine, for ¼ of an hour, and entered a large háwí, where we halted, having the Tigris close to. On the high bank over us is an ancient small fort, called Kala'h-el-Jebaráníyah. We here found the caravan and our barley; but, as there is very fine grass, we resolve to reserve it. From here the Fakká bears N. ¼ W.; extreme end of Jebel Mak-húl N.N.W.

After making all snug, and when every party had squatted down

on its own bivouac-ground, Saláh went round to reconnoitre them: he soon halted in front of one group, and, calling up to him a wild-looking Arab lad, asked him what he wanted here. The lad said he belonged to the caravan, and was going to Járah. Saláh had his sword sheathed in his hand, and without farther ceremony gave the lad a blow with it on the head, which brought him to the ground in an instant, and would have killed any man but an Arab, saying, "You son of a dog! Allah curse both your parents; you are not going to take me in!" Here all the people came up with their arms and sticks to know the cause of such a strange proceeding. Saláh drew his sword, and demanded if any one here present knew the lad. All looked at him, and answered, "No;" that all they knew was that the lad had been seen with the caravan, and that each party thought he had belonged to another. Saláh, at the first glance, knowing the culprit to be a thief slinking along with us, to run away with a horse, or whatever he could find, after dark, proposed instant decapitation; but he was pacified and contented by giving him a good flogging; and, having tied his hands and feet, ordered him to be well guarded till morning.

11*th.*—The prisoner was discharged after many cuffs and kicks from the donkey-drivers. At 5 A.M. started, keeping about N.N.W., close under the cliff: in ½ an hour passed a small ancient fort in ruins, on the cliff. It is called Kal'ah Bureyyásh. At 7h. 45m. got to Khán Kharneinah, a fine ruin of the age of the khaliphs. A set of Arabs are now engaged in knocking it down, and floating the bricks on rafts to Baghdád. At this place the high land and the rocks cease, and the country appears to slope gradually to the river. We now turned down N. by E. for ½ an hour, and halted under some tamarisk-trees on the bank of the Tigris. Here Sayyed Hindi complained very much, and on examination I find two of his ribs broken, so send him back to Tekrít on one of the rafts carrying bricks from the ruin.

The vagabond whose donkey Shi'ál rode refuses to go on, saying the people who hired him at Tekrít hired him only this far. Let the rascal go, determined to pay him off on our return, and gave Shi'ál, Sayyed Hindí's horse. At 3h. 25m. P.M. we again went on, N.W. by N., over undulating sandy ground: the stones and lime-stone appear to have ceased. At 5 we edged off to the right; and at 5h. 30m. halted at one of many bitter wells, in a large clump of moving sand-hills, called El-Marrás and Ghurabá; extreme of Mak-húl N. by W.; extreme of a lower and more distant range N.N.W. The donkeys have been left far behind.

12*th.*—At 5 A.M. started, going N.W. by N. to N.N.W., over a plain actually swarming with antelopes. At 8 had sand on our left called Má-sultániyah (where there are bitter wells), about an hour off. 8h. 30m. going N. by W., closing fast with

Jebel Mak-húl. 9h. 20m. another set of wells and sand-hills called Menjar, left. 9h. 40m. passed the ruins of a stone building called Khán Sultáníyah; on our right is the bluff termination of Mak-húl, and on our left, at various distances, are bitter wells. At 10h. 30m. got to the lowest and last projection of the Hamrín hills, and halted at a small stream of slightly brackish water. The place is called Bilálij, from two knolls of that name near it. Here we found the donkeys, and, after a sound lecture, Saláh cautioned them against leaving us again, and appointed Sherkát for to-night's halt in case of separation.

At 2h. 30m. P.M. we mounted, and went N.W. over the ridges of the Hamrín, one mass of transparent gypsum, then across the intermediate flat valley called Wádí Jehennem, and at 5h. 15m. got to the top of the last range, here very low, but higher to the right, where it is called Jebel Khánúkah. We saw Kal'ah Sherkát N.E. ½ N., and, as I was anxious to examine it well, my party posted on straight for it over hill and dale, leaving the donkeys to follow by the beaten path. After no little breakneck sort of work, we reached the ruins at 6h. Kal'ah Sherkát is a gigantic work, an irregular oblong square solid mass, 500 yards long by about 300 broad, its greatest height about 60 feet. It fronts nearly the cardinal points, the longest diameter being from north to south; on the top near the N.E. corner is a conical tel about 40 feet high, built of sun-dried bricks, surrounded by a dyke of rough stones, which in one place runs up part of it.* Close under this cone, on one corner of the solid square, are a few remains of buildings of cut stones and of most exquisite finish, and all over the building are traceable the foundations of stone edifices, with abundance of broken bricks, pottery, and glass; there is also an Arab burying-ground. The eastern side is washed by the Tigris, the western and southern are guarded by a deep ditch, the northern is in a hawí full of brushwood, and is the most perfect as also the highest; in one or two parts of this latter face are still remaining perfect fronts of the ancient outer facing of very large square cut stones, levelled and fitted to each other with the utmost nicety. In other parts of it are sections which show the solid mass to be composed of sun-dried bricks, but having no reeds interposed as at Babylon and Aker Kúf: in this northern face at the bottom is also seen the entrance of a subterraneous passage fallen in and choked up. I rode all over and round it till dark, endeavouring to find the statue well known to be about here, but failed. The barley did not come up, and as there is but little grass our horses were badly off. Lighted fires and fired guns for the caravan, but to no purpose.

13*th.*—Nearly eaten up last night by mosquitoes. I have

* A sketch of this ruin, by Mr. Ross, is preserved in the library.

never yet met with such fierce and numerous clouds of them. The Tekrítís not having come up at daylight, I again mounted to look for the statue and examine the ruins, and, on going to the southern end of the Kal'ah, was surprised to find the ruins and mounds of a very large city covered with stones, bricks, pottery, &c., and in places where cut away by the river, showing hundreds of sepulchral vases. The ruins occupy a sort of triangle, perhaps a mile or a mile and a half in length, formed on the east by the Tigris, on the west by Jebel Khánúkah, and on the north by the Kal'ah and other ruins.*

I kept wandering over the ruins for 3 hours without discovering the statue; from the Kal'ah at the conical mound, Jebel-el-Nejm near Mósul bore N. ½ E. Two tels (across the river), called El Abr, N. N.E.; Kará Chók hills extend from E. by N. to N.N.E.; gap in them through which the lesser Záb flows N.E. I now went back to our people and found the donkeys and barley had fairly given us the slip; finding ourselves in this condition, Saláh called a council of war, and, after commenting very strongly upon the treachery of the Tekrítís and the revenge he should have on his return, he told old Shi'ál the object of our coming, and said that, as Al Hadhr was only a day's journey off, it would be a disgrace to turn back, and proposed that, as the horses were good, and a chance of green grass inland, and that as we could see the ruins and return to Tekrít in 5 days, we should trust in God and go on. We unanimously agreed to his proposal, and, after the Arabs had repeated a short prayer aloud for safety and divine protection, we at 7h. 30m. A.M. mounted and struck off N.W. ½ W., first over undulating ground, then along the bed of a small brackish stream in a small valley called Wádí-el-Meheïh. At 9h. 30m. halted at a plot of fine green grass to give the horses a feed, Sherkát bearing S.E. ½ E. Here I observed the Arabs were evidently not at ease; each got on the top of a small knoll, and, lying flat on his face, kept scanning the horizon in all directions for upwards of an hour, looking for smoke or any signs of human beings being about. At noon we mounted; at 2 P.M. Sherkat bore S.E. ¾ E.: here we crossed a brackish rivulet called 'Aïn-el-Tha'leb: the country now consists of long low undulating ridges, like the waves of the sea, and we can see nothing beyond the one we happen to be on. Between each undulation is a valley which in winter must have abundance of water. The Arabs are now gloomy and silent, looking suspiciously about; their very features are changed, and, as I happen to have the best eyes of the party, they are constantly reminding me to make good use of them. At 4 P.M., in ascending one of the backs or ridges, came upon the foundation of a thick stone wall or pavement run-

* A small plan of these ruins accompanies Mr. Ross's MS.

ning in a straight line nearly N.W. At 4h. 15m. I saw ruins far distant W. by S., which the Arabs instantly pronounced to be Al Ḥadhr, and we changed our course straight for them. The distant ruins soon appeared with an awfully grand effect; a thick black cloud, behind them, was darting out the most vivid flashes of lightning, and we could distinctly hear the peals of thunder. Old Saláḥ shook his head and said, "Sir, I do not like this, we should not have come here; this ground belongs to Iblís." I confess I myself felt a sort of creeping sensation coming over me At 5h. 15m. having reached grass and water, and finding it impossible to arrive at the ruins to-night, we halted, and had barely time to fasten the cattle and huddle together, when there burst over us the most terrific storm I ever beheld: we were ankle deep in water in a few minutes, though on a slight declivity. The storm lasted for about 4 hours, and the water settled into the valley; yet in less than an hour afterwards the Arabs, to my astonishment, contrived to light a fire and boil a little coffee. This revived us, and, as sleep was entirely out of the question, old Shi'ál related to us many extraordinary anecdotes of the celebrated Shammár Sheïkh Bánayá, whose servant he had been from his own childhood till the Sheikh's death; some of them were very curious;—I here insert them:—

The tribe one evening was forced to encamp on a part of the desert near Sinjár, where not a bit of shrub nor a blade of grass could be procured. They had scarcely pitched the tents when some of the 'Aneïzah (at that time friends) arrived and halted at the tent of Binnáyá. Not to give them coffee, and even dinner, would have been an everlasting disgrace, and how to cook either no one could divine. At last Binnáyá went to a travelling merchant, who happened to be with the tribe, and bought two bales of coarse cotton cloth; these he had torn up and soaked in melted butter: with this a fire was made, and the guests had as good a dinner as was ever cooked in Bedwin camp: Old Shi'ál swore he himself tore up the cotton.

Two men came before him to settle a difference. One claimed a camel from the other; and, his case being clear, the sheïkh decided in his favour: the other demurred, and Binnáyá sent them to the old men, who confirmed the first sentence. Still the defendant would not give in; so the sheïkh sent for him, and after some abuse, gave him a poke, seemingly a slight one, with the small crooked-headed stick always used by the Bedwins; yet so tremendous was his strength, that the wood passed through the poor man's chest and out at his back, killing him dead on the spot. The Sheïkh had to pay his blood-money.

On another occasion, while sitting with a number of people in his tent, he observed two eyes peeping through the reed mat

which separates the women's part of the tent from that of the men, and, this being once or twice repeated, he became annoyed, and took up the iron pestle used to pound the coffee: after seemingly playing with it for a few seconds, he threw it, to all appearance carelessly, against the mat: a shriek followed, and, on the people going in, his own wife was found dead, her head having been smashed by the force of the blow.

Binnáyá, when the tribe fought, always charged first alone: he wielded his weapons equally well with both hands, and the terror of his name and appearance was such that a thousand men would scarcely venture to oppose him. He was tall and gaunt, with a scanty beard, large eyes, long projecting teeth, and an immense long hooked nose. Once, when out with a small party, he fell in with a large force of the 'Aneïzah (then at feud), and, having put a reserve spear between his thigh and the saddle, charged singly. His first spear soon broke; the second shared the same fate: he took to his sword, which also went close to the hilt. The enemy pressed upon him, and Binnáyá was, for the first time in his life, seen to turn his back and run: he soon, however, pulled up, when it appeared that in the interim he had separated the stirrup-leather from the saddle, and, swinging the heavy iron round his head, returned, though desperately wounded, to the fray: his friends followed, and the day was soon decided. He here received a wound in the shoulder, which for years did not heal, and eventually protruded into a large mass of raw flesh: for this he came to Baghdád, and was sent to the medical officer attached to the British resident, as the only person who could cure him. The surgeon proposed to cut it out: the sheïkh consented to have it done instantly, but positively refused to allow any one to hold him during the operation, which he bore with the most perfect indifference, telling the operator to cut deep and never fear.

The death of this extraordinary man was a vile business, and will remain for ages a foul stain on all those concerned in it. He was fighting with the Montafik under blind Hamúd, and had for some days driven them all before him. One night, however, it rained, and next morning, on renewing the fight on slippery ground, and after doing wonders, his mare fell with him; she broke her leg, and, rolling over him, broke his back. While in this state and alone a party of Montafik, headed by 'I'sa (the present Sheïkh) were galloping past. Binnáyá called to them, and, making himself known to them, told them to go and tell Hamúd that he was hurt and dying, and wanted to see him, as all enmity must now cease. 'I'sa told his party that, if they carried Binnáyá alive to Hamúd, the latter would be sure to spare him,—a thing which never must be done; at the same instant he thrust his spear through the prostrate hero, and several others followed the

brutal example. They then cut off his head and sent it to Baghdád to the Páshá, who ordered it to be thrown to a lion; but the animal not only refused to touch it, but sprang about his cage in the utmost terror until the head was drawn back. Here Old Shi'ál shed tears, and, stroking his beard, ejaculated, "Oh, 'Isa, the curse of God upon him who begot you, and on her who brought you forth: but I have had my revenge: not very long ago I saw Ajal, the Montafik Sheïkh, on the earth, like a dog, and fifty Shammár spears through his body, and perhaps I may yet see your grave defiled."

One of Binnáyá's daughters is still living, and is looked upon by the Shammár as little inferior to a deity. She holds a diván every evening, and her word is law. I have several times gone to her tent, and she once or twice sent me a dinner. She sits behind a screen at her evening meetings: her name is Abtah.

14*th*.—At 4h. 30m. A.M. mounted and made straight in the direction of the ruins; at 6h. saw them; at 6h. 30m. came to a hollow in which is a very large natural cave, with a small stream of water issuing from it. At 6h. 40m. got to the Tharthar, in a Wádí about 200 yards broad covered with grass. The Tharthar itself is here about 50 feet broad, deep, and the water just drinkable. We wandered up and down, but could find no ford: at last Ṣaláh and I stripped to our shirts, and I tied my watch, compass, and note-book on my head, and, being sure of my horse, plunged in, followed by Ṣaláh, at 7h. 45m. The current was rapid, but a few strokes landed us in safety. We reached the ruins at 8h. 10m. I shall give the description of them at the end, and here go on with the journal of our doings.

We had been about two hours among the ruins taking rough sketches, measurements, &c., and I was just proceeding to measure the diameter of the city walls, and to count the bastions, when I saw on a rising ground in the distant horizon to the north a horseman. I called Ṣaláh, but he could not distinguish him. While pointing out the direction I saw another join the first. Ṣaláh still doubted, saying it must be a wild hog or a bush, as no human being could be there, for if the Aneïzah were out they must appear from the south, or if the Shammár, from the west. The appearance of a third, though still invisible to Ṣaláh, settled the business. He said, with a hollow, changed voice, "We must be off. Allah! Allah! what brought us here?" and off we went, as hard as our horses could, to join our people. I had just time in passing to observe that the general course of the Tharthar is S.E. and S. by E. On getting to our people we instantly saddled, and at 10h. 40m. we were on our return, flying by the same route which brought us. I told Ṣaláh to be more calm—we

were five, the enemy only three: he called out, "Oh, Sir, where you see dogs you will find fleas."

At 11h. we heard the horrible war-howl of Arabs behind us. Ṣaláḥ called out to us to stand fast together while he went to meet them. If they are Shammár we shall be plundered, but if Aneïzah my party may get off, but the Bedwins must fall. I ordered my people to be cool, and not on any account to fire unless I ordered. We were in a hollow, and our speeches were cut short by the appearance of about a hundred horsemen coming over the low ridge behind us at full gallop, and about the same number on our flank. The sight, though far from pleasant, was very grand; the wild disorder, loose flying robes of every colour, spears with round tufts of ostrich-feathers; the howling and yelling had a most romantic effect. When within about 150 yards my camel-man called out that they were Shammár (he himself was of that tribe), and told us not to attempt resistance. In another instant they were upon us, and I found myself alone, separated from my people, whose horses had started, perfectly jammed up by the Arabs, and their spears within a few inches of every part of my body. One called to me to dismount and throw down my gun. I asked, "And if I do?" he answered, "Safety; fear not." I uncocked my gun, and laid it across the saddle; they at the same time shouldered their spears. One seized me by the clothes, and, my horse having kicked out at his, the part gave way; another then seized my gun, and pulled me off, and in the fall the gun remained with him. My old horse appeared to take the matter up, and by kicking and fighting cleared an open space: in the mean time, Ṣalaḥ had been undergoing the same treatment, but, getting a hearing, said he was an Ajeïl and a Shammárí. The chief asked what he did here? Ṣalaḥ said, "By Allah, we were going from 'Alí Páshá to Mohammed Páshá of Móṣul, and that I was an Albanian." The chief answered, "Oh, Bedwín, do not lie: first, this is not the road; and, secondly, your backs are to Móṣul, and your faces to Baghdád." All called out, "They are from Reshíd Páshá; cut the dogs' heads off." A second scramble took place; our camel was made to kneel, and the baggage thrown off. I was knocked down, and in an instant was nearly naked, when an old man (for they were still galloping up by dozens) pushed them all aside with an air of authority, calling out in a thundering voice, "Avast (awásh)! that is no Turk,—that is the Báliyóz.* I saw him two years ago in Sheïkh Zebaïd's tent: let no one touch him; I protect him." An immediate calm ensued, when Ṣalaḥ, now nearly naked, advanced, and said, "Now that

* Consul, from the Greek Balios, and Italian Bailo.—F. S.

you know us, I shall tell you the truth;—that is the Báliyóz; we came here to see Al Ḥadhr, and we are now going back." Everything was now set right; an order was given to restore everything taken, even to a hair, if one had fallen from our heads, and duly obeyed. We sat on the ground good friends. Their chief told us we had done a very foolish thing in coming here without their knowledge, as it was dangerous ground; they never see any one here except themselves or their enemies, and for the latter they had taken us. He then said in the most beautiful Arabic style, "If we had in the hurry killed you all, what answer could we give your friends, or what satisfaction could they expect? When we find strange people here, it is not the time to ask who they are, or whence they have come; Allah has saved you." He then told us that all was in confusion, that Reshíd Páshá had in a most treacherous manner seized their sheïkh, Sufúk, while a guest in the Turkish camp on the most solemn pledge of safety, and had sent him prisoner to Constantinople; consequently the Shammár had all rebelled and come to the desert. They then invited us to their camp, and I was inclined to go, but Salah whispered to me that we must get off as soon as possible, for as soon as the seizure of Sufúk was known there would be a great outbreak in Mesopotamia.

They are the 'Abdah and Aslam branches of the Shammár, and had seen me this morning on the top of the ruins, when, taking us for Aneïzah, the tocsin was sounded: even as long as we remained with them parties were dashing in. All carried reed spears, and many rode beautiful horses. After many protestations and oaths by the Arabs, that their tribe and ours had, thank God! always been friends, and that they had never seen anything from us but good (illá-al-khïr), and that, please God, that friendship would last for ever, the affair of to-day being nothing at all, and after many huggings and kissings, we parted, they to their tents, and we on our return. At 12h. 30m. P.M. we were fairly clear of our friends, and keeping an E. by S. course. I observed the Wádí here are covered with wild barley, but the horses will not eat of it. At 2 h. 15 m. halted for ten minutes to breathe our cattle, and then went on S.E. by E. At 4 h. got on the more elevated of the two ridges, called El-Kaṭr, seemingly the termination of the Hamrín range, Al Ḥadhr, bearing W.N.W., Kal'ah Sherkat E.N.E., Mak-ḥúl S.E. by S. We now kept along the ridge in a south-easterly direction. At 5 h. we turned off more to the eastward to look for water, till 6 h. 15 m., when, finding nothing better, we were fain to halt at a salt-water pool, round which was abundance of good grass.

15th.—Old Shi'ál took his leave to go in quest of Sheïkh Fa'ad, somewhere in the direction of Mósul, after I had given him a

present, which, though small, exceeded his most sanguine expectations.

At 4 A.M. we started, going S.S.E. ½ E. At 6 h. 20 m. joined our former route in Wádí Jehennem, just where the road crosses the ravine, and made straight for Bilálij, where we arrived in an hour, and halted, our horses very much annoyed by the purgative qualities of last night's water. At 9 h. we mounted, and kept on our former route. At 12 h. 20 m. P.M. had Sultáníyah wells on our right. At 2 h. 15 m. got to El-Marrás, and halted till 3 h., then on again. About the sand-hillocks here we found footmarks of a numerous body of horse, not twelve hours old, so Saláh was again uneasy, and as we went along was always calling to me, as God had given me sharp eyes, to make good use of them now, for in this cursed country it was necessary to have eyes all round the head,—ay, and (by Allah!) even in the crown of the head, for he believed those Shammár (Allah confound them!) sometimes dropped from the clouds. From El-Marrás we kept S.S.E., and at 6 h. P.M. stopped on the bank of the Tigris under Kharneïnah, close to our former halt.

16*th*.—At 4 h. A.M. started on our old road. At 5 h. 15 m. saw an opening in the rock on our right very much like the door of an artificial cave; it is too high up to be accessible. At 6 h. 20 m. passed Bureyyásh, and at 6 h. 55 m. halted on our former ground under Jeberáníyah till 8 h., then on as before, the horses lagging much. Exactly at noon we got to Tekrít, our poor animals knocked up from fatigue and hunger, being the fifth day without corn.

I found Sayyed Hindí with ague, in addition to his broken bones. In the evening, the governor and all the old men having assembled to congratulate us on our return, and to hear our adventures (they being in great alarm about us after the return of the donkeys from Járah), Saláh made a formal statement of the barley affair, abusing the Tekrítis *en masse* for the most notorious scoundrels and lying rascals Allah ever created, and swore he should not leave the place, neither should he eat in it, until the barley or its price, its hire, and that of Shi'ál's donkey were returned. The kádhí being present gave a verdict in Saláh's favour. I now told Saláh that, as we were by God's blessing safely returned, we ought to let all pass. He said, in great passion, "Oh, sir, you do not know these dogs; they themselves say that they are of the same tribe as the Mósul Gaurs, but I suspect they are Jews: by Allah they even will not pray unless they be paid for doing it." At this a shudder went through the assembly; some called out to give him all he wanted, others to give him ten-fold rather than be called Káfirs; and I found some difficulty in preventing a rupture.

17th.—Halted to refresh. Sálah made the fellows pay back his barley, but was persuaded to forgive them the rest.

18th.—Left Sayyed Hindi to come down by a kelek, or raft, and at 5 h. A.M. started on our former course. Soon after leaving Tekrít we overtook a caravan of camels returning unladen from Mósul to Baghdád, and joined it. At 6 h. 20 m. got to Sherí'at-el-Wojá, and halted till 6 h. 45 m., then went on. At 7 h. 10 m. passed a large square mound inside the Isháki; at 8 h. 30 m. arrived opposite Dúr; and at 10 h. 15 m. halted on the river's bank. At noon continued our journey, halting occasionally to graze the cattle; the camels will not pass a clump of thistles without eating them up. At 5 h. 45 m. halted, intending to remain all night. The Málawíyah N.E. by E. ½ E.; 'Ashik N. by W. ½ W.; Kaff-el-Kelb N.W. About sunset clouds of mosquitoes came out, and the camels would not keep quiet; so at 7 h. 30 m. we again went on, and at 11 h. halted on the high land S. of Istábolát.

19th.—At 4h. A.M. set out along the Dijeïl, which makes numerous angles. At 5 h. 15 m. crossed a small dyke, running S.S.E. and N.N.W., forming a triangular enclosure with the Dijeïl and Chalú; at 5 h. 40 m. crossed the Chalú, and kept to the left of our former route. At 6 h. 15 m. halted. I here killed a spotted snake 5 feet long, with a large head and small neck: it had very long fangs, and is the first poisonous snake I have seen in this country. At 6 h. 30 m. again went on; old canals running in every direction. At 7 h. 45 m. halted at the bridge of Harbah till 8 h. 30 m., then crossed it, and passing the ruins of that place went straight for Sumeïchah. We went for some time in and along the Shat-aïdhá: it is not so broad as the Tigris, winds a good deal, and is covered with verdure, but has here no water in it, as far as I can see. At 9h. 40m. we were going over the ruins of a very considerable city, consisting of mounds covered with broken bricks, pottery, glass, &c., and sepulchral vases; the ruins are on both sides of the Shat-aïdhá, and appear to be very extensive—the Arabs knew of no name for them. At 10h. 20m. crossed a large ancient canal, and soon afterwards another. At 11h. 45m. got to Sumeïchah, and halted. Jóhar Aghá left here this morning for Baghdád.

20th.—At 3h. 50m. A.M. started on the high road as formerly, having picked up the Arab we left here in going. We leave the caravan of camels to follow. 5h. 15m. passed Sayyed Ibráhím, and kept the beaten road westward of our former one; at 6h. 15m. had Tarmíyah on our left; crossed an ancient canal which goes southerly. At 7h. 30m. kept W. to avoid marshes formed by the Tigris. At 9h. 30m. hauling round to our left again; 10h. crossed a canal running E.N.E. From 11h. till noon we were employed in picking a passage through the marshes which have

come over from the Saklávíyah since we were here before. Passed between Kádhimeïn and the Tigris, and at 1h. 30m. P.M. reached the gate of Baghdád.

My examination of the ruins of Al Hadhr having been put a stop to in such a sudden and disagreeable manner in May, 1836, I determined to revisit them as soon as possible; accordingly, early in May, 1837, a party of Shammár Arabs being about to return from Baghdád to join the Sheïkh, who was encamped near the ruins, I resolved to accompany them, and, having easily made their acquaintance, and all arrangements being settled, on

May 10*th*, 1837, at 7h. 45m. A.M., we left Baghdád by the Kádhimeïn gate; the party consisting of myself, two servants, seven Shammár Bedwíns, and a native of Baghdád going on business to the tribe. The Bedwíns carry a present from 'Alí Páshá to Mohammed-el Fáris,* the Shammár Sheïkh. After passing Kádhimeïn we kept to the right of my former route, much nearer the river. At 9h. 40m. passed a flat mound called Tel Kasr.† At 10h. 25m. touched the river at Sherí'at-el-Beïdhá.‡ At 11h. 35m. got to Tel Kúsh,§ and halted in a small camp. Kádhimeïn indistinctly seen through a date-grove S. by E., Khán Suweïdíyah N. At 2h. 35m. P.M. we again went on N.N.E. At 5h. 35m. came upon large ancient canals, called Madód, the main branch running N. and S. Here robbers generally wait for caravans, the high mound affording capital concealment. We now went over plains and low flat mounds, completely covered with broken pottery and bricks, evidently the site of a populous town, in a direction N.N.W., having the Shat-aïdhá on our left; it winds very much, but is not broad. At 6h. 22m. turned west along a curve of the Shat-aïdhá, thinking we saw tents, but, soon finding ourselves mistaken, we came back to our old course. At 6h. 45m. passed Tel Tarmíyah, a complete mass of broken bricks, seemingly modern, or at least not of very ancient date. At 6h. 55m., seeing a fire, made for it, but on reaching it we found only a few camelherds, so turned back to get to the road, and shortly passed the ruins of Wánah, and soon afterwards some rather large *tels* and a small tomb. At 9h., hearing dogs bark, we turned off to the northward for them, and in half an hour halted in a small camp.

11*th*.—At daylight found the country covered with scoriæ and small mounds, Sumeïchah bearing N.W. At 5h. 25m. A.M. started, crossing a bight of the Shat-aïdhá, here broader. At 6h. passed an imám's tomb, about half a mile on our right; and soon after entered Sumeïchah, and halted till 9h. 45m., then went on in

* The Horseman, Cavaliere. † Castle Hill. ‡ White River.
§ Bird Hill.—F. S.

a N.N.W. course. At 1h. 20m. P.M. reached Ḥasbah, and halted in a corn-field for half an hour; then went on, having the Dijeïl close on our left, and occasionally touching the Shaṭ-aïdhá on the right. At 2h. 50m. a ruined village, called Alth, across the Shat-aïdha. At 3h. 10m. entered a ḥáwí. At 3h. 35m. crossed a branch from the Dijeïl in a high aqueduct, and in ten minutes halted at the tent of Tha'ar, Sheïkh of the Mujammerah. The poor man is blind: some years ago a party of 'Alí Páshá's háïtás halted in his camp, and when dinner came in they objected to its quality: the Sheïkh said he was sorry for it, but he gave the best he had: the háïtás became abusive, drew their weapons, and a fight ensued: almost the first shot knocked out both Tha'ar's eyes. Most of the háïtás were instantly murdered: the rest, by escaping to the neighbouring tents, and taking Dakhíl, escaped.

At. 8h. 25m. P.M. we mounted, going W. for a few minutes, crossed the Dijeïl, the water being only to the girths, and then kept on the high road, as in my former journey. A large snake got amongst the horses' feet, and hissed like an enraged cat, but fortunately did not bite any of them; the animals snorted and trembled with fright. At 10h. 45m. passed through Isṭábolát, and kept on till the

12*th.*—At 12h. 25m. A.M. we halted in a háwí. At 3h. 45m. again went on. At 5h. 40m. halted under 'A'shik till 6h., then on again. At 9h. halted on the river's bank till 10h. 20m., then on. At 10h. 40m. passed Meḥjar. At 1h. 15m. P.M. halt under the Túthá till 1h. 50m., then leave the ḥáwí as formerly. At 3h. 5m. got to Tekrít, and halted: I went to the house of, I believe, the only honest man in the town, Ḥájí 'Omar. There has been a change of government since my last visit. The people cannot make out my object in going again to Al Ḥadhr, unless to bring away a treasure which they say I found there last time.

13*th.*—At 4h. 50m. A.M. started as formerly; at 7h. 30m. edging off to the right for the river by a very dangerous road over the face of a high cliff, the river washing under it. At 8h. 15m. halted under Jeberáníyah till 8h. 45m., then went on. At 11h. 30m. halted under Kharneïnah till 1h. 20m. P.M., when, about twenty Shammár Arabs having come up, mounted on camels, we went along with them for their tents, keeping the Sulṭáníyah road, course north-westerly. At 7h. 5m. halted in an immense camp of the Shammár at Sulṭáníyah bitter wells.

The Arabs are the Alian branch of the tribe, under Sheïkh Dukheïl-ibn-Shebánah, to whose tent we went, and met with a real Arab welcome. I got the Sheïkh's own camel-saddle to lean against as a pillow, and, as no concealment of my character was necessary, we were at home with each other. The Sheïkh is a venerable-looking old man, and is looked upon as one of the pa-

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triarchs of the tribe, and has great influence. After about an hour had been spent in coffee-drinking, smoking, and news-telling, about ten or a dozen men carried in a sort of net a huge wooden dish of boiled rice; others followed with one of stewed meat: part of the latter was shovelled over the former by the not over-clean hands of the Bedwíns; and over all were poured a pot of melted butter and a skin of sour milk, and then to work we went. As one set left the dish another sat down; and I am certain that after all present, not less than a hundred, had finished, enough for fifty more was carried away. After this we had coffee, and then troughs of fresh camel's milk were brought in, of which each drank *ad libitum;* the milk, with the exception of being slightly salt, was equal to the richest cream. Outside the tent was placed in a rude sort of tripod a monstrous leathern bucket, filled with camel's milk; to this our horses were led up in succession, and they drank very copiously with great zest.

14*th.*—At 5h. 50m. we mounted, and continued N.N.W. and N.W. At 7h. 30m. came to a circular set of mounds enclosing a space of about 100 to 150 yards in diameter, and covered with scoriæ. The Arabs could give no name for it. At 8h. 20m. came to a large camp in a hollow called Manjúr, filled with pools of water, and said to extend considerably to the right and left.

At 9h. 30m. had a lake with a thin covering of salt on our left, called Sabakhah. At 9h. 40m. halted in a hollow: not far off, on the left, are white hillocks, said to be on the Tharthar. At 10h. 10m. went on again; and at 11h. 45m. reached the Tharthar. Crossed it, only knee deep; and in 5 min. halted in a camp of the Zóbah branch of the Shammár: got breakfast; and at 3h. 35m. P.M. continued along the Tharthar till 4h. 50m., when we unexpectedly came upon a vast camp, known to be the Sheïkh's by the large tents, when, having crossed the Tharthar, we halted. This camp left Al Hadhr two days ago. Mohammed el Fáris, the Sheikh, is absent collecting a present for 'Alí Páshá, but we were well received by his younger brother, Nijirib. In a short time after our arrival, Nejm, the Sheikh's uncle, came to see us, he being at present the ruler and patriarch. I gave him the letters from the Páshá, and from Colonel Taylor, requesting his assistance in forwarding our object. These were, as usual, read in public, and every one gave his opinion against our going. They said this was the rear camp of the tribe, and the 'Aneïzah were hanging about, no one knowing for a moment where they were, or in what quarter they might appear. Only a few days ago they seized a large herd of camels; but the Shammár, getting immediate warning, pursued and re-captured the herd, and the robbers, twenty in number: eight or ten of the latter were put to

death on the spot; the rest were bound and kept for ransom. After a great deal of discussion on my affair, old Nejm declared, "That as 'Alí Páshá had written it, go I should;" that Nijirib and a party of horsemen should accompany me, and that the camp should not be moved till our return. I agreed to the proposal, and resolved to leave all baggage and my own people behind, in order to go light, and endeavour to do all in one day. During this day's march I saw about a dozen very large encampments, and I am certain upwards of 10,000 or 12,000 camels; yet we have only seen a very inconsiderable part of this enormous tribe.

This year the Tharthar is very low, and the water abominably bitter and salt, the source of it having been blocked up by the Yezídís in Jebel Sinjár.

15th.—Formed a party of eleven spears with the young Sheïkh. I only take three of my own people. At 6h. 15m. A.M. we crossed the Tharthar, and went over the country at a quick walk, about N.W. by N. The Tharthar was close to us for about 1 hour; it then took a sweep to the right. At 10h. 45m. were surprised to see tents on the stream; made for them; and at 11h. 20m., on getting close to them, found all the men under arms, but their number only about twenty. Nijirib galloped up alone to them, and quieted their alarm. They prove to be a few families of the Al Bú Mohammed Arabs flying to the Shammár for protection, as the Aneizah are out in good earnest; as is also Fa'ad, the deposed Shammár Sheikh, with a band. My fellows got a good deal staggered by the intelligence; but, as the ruins were close to, I promised to be ready to return at sunset. At 11h. 45m. turned off left; and at 12h. 30m. P.M. got to Al Hadhr. I examined the ruins thoroughly, as afterwards described. At last, being unable to keep my people in good humour any longer (and one of them, an old man, bringing up my horse and saying, "For God's sake, my son, take for this once the advice of an old man, who has seen many days, and let us return!"), we at 4h. 15m. P.M. mounted and kept about S.S.E., often cantering. A snake having started, Nijirib drove his spear right through its head. The Arabs called out, "Bravo!" I said it was an accident: he threw it down, and said, "Where will you have me pierce it this time?" I said, in the tail: the reptile was wriggling about, yet he made a rush at it, and in an instant it was whirling in the air on the point of the spear, the weapon having passed within an inch of the point of the tail. At sunset we could see the Al Bú Mohammed marching in the distance to the left, across the Tharthar. At 9h. 30m. we reached our camp in safety, after a ride of upwards of 50 miles. From the ruins the Sinjár mountains are seen high in the N.W.

16th.—At 6 A.M. the Arabs struck their tents, and marched

along the stream till 7h. 10m., then halted and pitched. To-day the Yezídís are coming in by scores, men, women, and children, flying from the Turks under Háfiz Páshá, who has already conquered nearly all the district of Sinjár.

17*th*.—There being good grass, the Arabs halted. To-day died Kheblah, the famous mare of Sufúk.

18*th*.—Struck tents, and at 6 A.M. marched along the Tharthar. At 7h. 30m. a tel, called Suweïsah, ¼ of a mile on our left. I rode to it, and found it covered with scoriæ; centre of Mak-húl bearing E. ½ S. We kept about S.S.E., at a little distance from the stream. At 8h. 20m. came to Nejm's camp; and he insisted upon our party and the Sheïkh's halting to feed, which we did, the Arabs all going on. Nejm, with the Zeïdán, is pitched to-day near a pool of rain water, which, though horrid stuff, is delicious after the Tharthar water. Nejm's feed was like the others; except that, to show us greater respect, he covered the whole dish over with about two stones of butter, so that I was obliged to thrust my arm up to the elbow through butter, in order to grope underneath for rice and a bit of mutton. After all had been demolished, I went out, to the great wonder of the Arabs, to measure the dish, it being the largest I ever saw. It was made of pieces of wood fastened together by twine; and I found its diameter exactly 4 feet 9¼ inches, and that it contained to-day, at one time, the divided carcasses of four full-grown sheep: as to the quantities of rice, melted butter, butter, and sour milk, I should be afraid to hazard a guess. In the evening we rode on to our own camp.

19*th*.—There being plenty of grass, did not move. This was about the hottest day I ever felt.

20*th*.—Halted. I observe the valley of the Tharthar gets broader, and has lately been cultivated, the water-courses, and even the shapes of the fields, being still visible. The stream here winds more than above. At 9 A.M. a camel with two people on his back came up to the tent, and one of them was no other than Mohammed el Fáris, Sheïkh Shammár, ruler of upwards of 12,000 families. He was a fine-looking young man, with large eyes, a slightly aquiline nose, and wore his hair in long plaited tresses, hanging over his shoulders. He was very well dressed; but appears to have discarded the effeminate practice of wearing shoes, and even trousers. He made many excuses for being away so long, declaring that the instant he learned our being in his camp he mounted on his return, and had been in the saddle since yesterday at noon. The news of his arrival soon spread; and in an hour the tent and the whole front of it presented a dense mass of the wildest human beings I ever saw. Every naked rascal, as he arrived, went up to the Sheïkh, and, having kissed him, sat down

to light his pipe without the slightest ceremony. The páshá's present, consisting of a full suit of clothes, was brought forward, and, while the letter accompanying it was being read, every man stood up, and, when finished, all called out "God lengthen 'Alí Páshá's days!" The dresses were put on the Sheïkh; but they did not appear to sit easy. The Kashmír turban was too heavy for the head, and was taken off and presented to the person sitting next him. The other articles were soon dispersed in a similar manner, and in 20 minutes Mohammed wore only his own Bedwín dress.

21*st.*—Struck our tents, and at 6h. 15m. A.M. marched along the stream. At 7h. passed a small tel with broken pottery on it; this, with the country about, is called Bakkah. At 8h. 20m. halted on the Tharthar, a white tel called Ajerí, about ¾ of a mile before us; the tomb of Sheïkh Hedíd distant 1½ hour, and on the eastern bank. The Tharthar continues in a direction nearly S.S.E. till lost in the salt lake inland from 'Ashik.

Yesterday I felt rather heavy, and to-day was seized with very strong fever and dysentery, I suppose owing to bad water and the intense heat; but the Arabs declare it is owing to having eaten some small fish shot yesterday by Sayyed Hindí in the Tharthar.

About noon old Dukheïl came to visit the Sheïkh, and brought the disagreeable intelligence of the 'Aneïzah having sent three ghazás, or plundering parties, into Mesopotamia: they severally crossed the Euphrates at Hillah, Jubbah, and above 'A'nah, and were last heard of going towards the Tarmíyah. I consequently determined to be off for Tekrít before things got worse, and there see what is to be done. The plan laid down by the Sheïkh and the old men for us was to start after dusk for Dukheïl's camp at Sultáníyah, stay there all to-morrow, then at night to go on, and hide next day in the thick wood about Kharneïnah, and get into Tekrít on the third morning. I seemingly agreed to it, but, after a private consultation with Sayyed Hindí, determined upon quite another mode of proceeding as soon as we were clear of the tents. I got several of the chiefs to point out on the compass the bearing of Sultáníyah: this was done in presence of the Arabs going with us, and they were satisfied that we could not now go wrong. After dinner, though far from well, I determined to be off, when the Sheïkh brought me a present of a horse trained to plundering excursions, which he declares will, if it should come to a run, carry me off from all the 'Aneïzah.

Our party, nine in number, mounted, and, after taking leave and having had prayers said for our safety, we at 7h. 40m. P.M. moved on in an E. by S. direction. I soon found the Arabs were going straight for Sultáníyah, but, as I declared the compass must be right, they were easily persuaded to keep to the right of the

true course. At 11h. 30m. we were going E. over sandy ground called Zobeïdí.

22nd.—At 1 A.M. kept edging to the right. At 2h. kept E. by S., and at 2h. 20m. got to the high road, when the Arabs at once discovered that I had taken them completely out of the track they intended coming by. Our object was now gained; and, having told them it would be a disgrace for us to turn back to Sulṭáníyah, as well as a loss of time, we must put our trust in God and go at once straight on for Tekrít. Sayyed Hindí smoothed them down, and we went on. At 3h. 35m. halted till 4h., then on again S.E. by S. I now felt very weak. At 6h. passed Kharneïnah. At 7h. 15m. halted on the bank of the Tigris. I had now almost lost all sense of feeling in the lower limbs, and became covered with a cold clammy sweat, but I never recollect having experienced so great a pleasure as I did in drinking a draught of the Tigris water after the horrid stuff we have had for the last ten days. At 8h. 10m. A.M. went on again. At 9h. 42m. went up from the ḥáwí at Jeberáníyah, and just as we got to the high land we found foot-marks of horses not an hour old, and in another minute saw the horses themselves in the bush below. Their owners sprang upon them and fell in; we closed up, lighted matches, and got ready: they were about ½ a mile off, and only eight in number. The Shammár at once knew them to be 'Aneïzah, and we prepared for a skirmish (being only nine), keeping on the high road, daring them to come on with prime abuse, but they stood still close together. My men declared it would be in vain to charge them, their cattle being fresh, while ours were done up: moreover, some of our men being on camels, we should be obliged to divide, a thing not at all advisable. As long as we could see them they had not moved. The excitement of the affair caused re-action in me, and I was now in a burning fever. As we went on the day became dreadfully hot, the glare intolerable, and not a breath of wind stirring. I thought it was to be my last; my senses deserted me, and all I can recollect is that at 1 P.M. we got to Tekrít.

About sunset I awoke and found myself in Hájí 'Omar's house, covered up and in a most profuse perspiration, and consequently much easier. A small thermometer, cut to 125° in the usual sort of leather case, was burst in my pocket by to-day's heat.

I find the road by Mesopotamia is not to be attempted at present, so I determine to dismiss the Arabs here, and send them down by Sámarrah; and, finding myself perfectly inadequate to another day's ride, I have made up my mind to go down by water, and have ordered a kelek, or raft, to be made.

23rd.—I feel very weak to-day; my servant and two of the Arabs are ill, one of the latter quite delirious, and so ill, that I

must take him with me. After breakfast sent the Arabs off. About 10h. A.M. I had a most violent attack of vomiting and cramp in the stomach, followed by smart fever: however, when the raft was ready, we all went on board, and at 1h. 15m. P.M. cast off. About the Withán there are many islands in the river; in our channels the lowest casts were 8, 7, and 5½ feet. At 4h. 20m. passed Dúr; had 7 feet. At 5h. 10m. passed the Nahrawán, and at 10h. 30m. brought to off Sámarrah to give the people a few hours' sleep.

24th.—At 3h. 30m. A.M. cast off; at 5h. passed Ghäïm, the wind heading us. At 7h. 45m. made fast to an island on the right bank, as the water was too rough. I feel much better. At 10h. the wind lulled and we went on. At 10h. 30m. passing Khán Mizrákjí. At 11h. 10m. the weather became squally, so made fast. At 4 P.M. again loosened and went on, E. by S.; the river full of islands. This is the place where the natives say the steamer could not stem the current; but I feel confident she could do it easily: 6h. 15m. opposite Khán Tholeyyah. At the Minthar, and below it at Sayyed Mohammed, the right bank has been cut away, and shows many sepulchral vases and bricks: lower down the river for some distance flows N.E. and even N., then sweeps round to its proper direction. At 11h. 15m. P.M. were again obliged to make fast, having a strong breeze from S.E.

25th.—Wind still S.E., but lighter; so at 4 A.M. we went on. At 5h. 15m. stopped to blow up the skins till 5h. 45m., then went on again. At 9h. 40m. got to Sindíyah, and went alongside the *Euphrates* steamer. Here finding Mr. Hector, who was this evening to proceed to Baghdád in a covered boat, I resolved to go with him, and sent the kelek on, which did not arrive till five hours after us.

At 6h. 30m. P.M. left the steamer in the boat, and rowed down the river, and at the same hour on the following morning arrived at Baghdád.

Description of Al Hadhr.

The ruins of Al Hadhr occupy a space of ground upwards of a mile in diameter, enclosed by a circular, or nearly circular wall, of immense thickness, with square bastions or towers at about every 60 paces, built of large square cut stones. The upper portions of the curtains have in most places been thrown down, as have been also some of the bastions, but most of the latter may still be said to be in very fair preservation, each having towards the city vaulted chambers. Outside the wall is a broad and very deep ditch, now dry, and 100 or 150 paces beyond it is a thick rampart, now only a few feet high, going round the town (*see Plan*); and at some distance beyond the fortifications stand two

high mounds with square towers upon them, one on the eastern side, the other on the north.

In nearly the exact centre of the town stands the grand object of curiosity, whether temple or palace, I shall not pretend to say, enclosed by a strong, thick, square wall (partly demolished), with bastions similar to those of the city wall, fronting the four cardinal points, each face measuring 300 long paces inside. The square is in its centre intersected from north to south by a range of buildings greatly damaged, a confused mass of chambers, gateways, and one built pillar reduced to about 30 feet. Between this range and the eastern wall appears to have been a clear space. The principal buildings occupy the western side, and consist of a huge pile fronting the east, and part of a wing fronting the north. The ground-story only remains perfect, and consists of a range of vaulted halls of two sizes.

Beginning at the southern end of the large pile is, first,—

No. 1. One of the smaller halls, in a perfect state, having at its lower end a square doorway, the top of one stone finely carved, leading into a similar apartment which receives no other light. Externally, every stone in the spring of the arch has cut upon it in high relief a human bust, some with very curious curling bag-wigs, but all are more or less defaced from long exposure to the weather. The height of the hall is, I should think, about 30 feet.

No. 2. A large vaulted hall, 32 long paces in depth and 12 in breadth; the roof has fallen in from end to end, but I think when perfect, it must have been 60 feet high. The few stones remaining of the spring show outside on each the figure of an angel or female, apparently in the air, with feet crossed and robes flying loose; underneath the spring is still visible some beautifully sculptured foliage. In each side of this hall are three square pilasters, and in each of these, near the crown, have been three full round faces in very high relief and executed with great spirit and boldness; twelve of them are still in their places, and one much mutilated, lying on the ground, measured 2 feet from the tip of the chin to the top of the forehead. They have much the appearance of Greek or Roman execution: one is a young and apparently female face with wings on the temples; another has a wild look, with the hair loose; another has a serpent hanging from each temple; some are male heads with a fine placid expression, and one is the face of an old man with large mustachios and a beard separated into twists like so many pieces of rope; this latter the Arabs call Kúzí. Many of them have a binding round the head like a double fold of rope; and a hole cut into each eyeball gives them almost the look of life. Along each side of this hall is carved in high relief a fine cornice of round balls sunk into ornamental work; these from the ground seem about the size of

twelve-pound cannon-balls. The tops of the pilasters reach above the cornice, and are crowned with sculpture similar to it. From the back of this hall a square doorway leads to the passage round No. 8; an arched doorway close to it has been built up, and near each back corner is a doorway leading to a subterraneous room on either side. I descended into one, but from want of light could only make out that, like all above, it was vaulted,

Nos. 3 & 4. Exactly like No. 1, but having no openings behind. From the wall dividing them a low ruined wall, only a few feet high, runs to the gateway at No. 11, seemingly the remains of a central division.

No. 5. A large hall, roof fallen in; busts on the few remaining stones of the spring, three pilasters in each side, in each of which have been two faces, but most of them have fallen down. The upper part of the northern side having fallen, gives a section of the upper stories; small square rooms over No. 6, devoid of sculpture, but now much destroyed. I think there must have been a door from this hall to an apartment which must exist behind Nos. 3 and 4, but the whole is now so choked up with fallen rubbish, that I could not make it out. On the wall outside, between this and No. 4, is a finely-sculptured figure of a griffin, with twisted tail, about 5 feet from the ground.

No. 6. Similar to Nos. 1, 3, and 4.

No. 7. A large hall, the whole roof and almost all the northern side fallen down. On the southern side of it, about 10 feet from the ground, is a line of eight monsters, bulls with human heads, the relief reaching to the shoulders; they are full-faced and about the size of life, a cornice over them. From the bottom of this hall a door leads to an oblong square chamber, devoid of sculpture.

No. 8. A square room, roof fallen in, having a vaulted passage all round, 2 paces broad and 22 paces on each side; this passage has two entrances, one from outside, west, and the other from hall No. 2; it has also two square holes or windows high up, one at each inner corner, being, as far as my observation went, the only approaches to windows in the whole ruins. The square room itself was entered by a door nearly opposite the back one of hall No. 2, but it is now filled up by stones; the upper part of the door is formed of one stone bearing a very exquisite relief of busts, birds, griffins, &c.

No. 9. A vaulted chamber.

No. 10. Two arched halls, roofs fallen in, busts on the springs.

No. 11. A confused mass of broken chambers, gates, and part of the shaft of a pillar.

As nearly as I could guess, the number of stones in each spring amounted to thirty; the outsides of the arches are square

pilasters, and between several of them are round pilasters. Between the cross range and the great pile the ground has been paved with large square stones, and the work is still in many places perfect. In this space are also still seen many deep, bell-shaped wells or reservoirs, having narrow mouths, but of vast diameter at the bottom, built of well-cut and closely-fitted stones.

The southern end of the great pile shows a stair leading in one line from the ground to the top: this pile most probably extended the whole diameter of the square. The dwelling-houses appear to have been confined entirely to the western part of the city; they are now merely long mounds and hillocks; but with a little close examination I am certain the direction of every street and square could be ascertained. Eastward of the central square a canal or ditch crosses the city, and between it and the city wall, in the same direction, are numbers of detached square buildings of a most dreary aspect, evidently the Necropolis: these are of different sizes, from 20 to 40 feet square, and about as many in height, some having two chambers, others only one; some have pilasters outside, others are plain.

The whole city is built of a brownish-grey limestone, so closely fitted that if cement has been used, it cannot be seen, and almost every stone in the great pile has cut upon it one or more letters or marks, seemingly the builders' number, as they are seen in the midst of broken walls, where they could not have been exposed when the structure was perfect. They are best seen in the square passage round No. 8: most stones have but one cipher, while many have two, three, and even five, thus—

During both visits to these ruins I endeavoured, by looking into every hole and corner, to discover the statues said by the Arabs to be there, but could find none. The last time, I brought from the camp a Bedwín who was to point out the statue of the woman milking the cow, so much spoken of by them, but he took me direct to one of the monsters in No. 7. I now much doubt the existence of any statue at all, at least above ground.

XXIII.—*Note on a part of the river Tigris, between Baghdád and Sámarrah.* By Lieutenant H. Blosse Lynch, Indian Navy.

In travelling, during the autumn of 1837, along the whole course of the Tigris, from its sources in the mountainous regions of Armenia to the city of Baghdád, I have bestowed much attention on the examination of the river, fixing its chief points by astronomical observations, and laying down others by a prismatic compass, checked, whenever it was possible, by cross bearings.

Throughout a great part of my journey the track led me over ruins, at one time amidst the remains of ancient palaces, at another over the ruins of modern huts: yet the river is ever a fine stream, and flows through a beautiful, fertile, and populous country. More pressing duty at the present moment does not admit of computing the greater part of my observations, but the tract between Baghdád and Sámarrah, comprising Opis, the Median wall, and Sipárah on the Euphrates, as having reference to many interesting topics, I have taken pains to examine with accuracy, and shall here describe. Time, I hope, will allow of several points of equal interest being added, during the period of my service in these countries.

Great care had been taken to ascertain the rate of three chronometers—M'Cabe, No. 262; Hedger, No. 473; and Tobias, No. 179—at a fixed station in Baghdád, during the course of nearly a month, by single altitudes of the sun and a star, and by equal altitudes of the sun. The transit instrument, lent to the Euphrates expedition by Dr. Lee, being on its way to England, the instruments used were an excellent repeating circle, the last work of the late Mr. Troughton, lent to the Euphrates expedition by Mr. C. Halford, and a theodolite by Berge; the watches were found to go very steadily; one of them was left at the station, and the other two taken, No. 473 by water, and No. 179 in the pocket; and we found, by comparison, on our return to Baghdád, that, during the eighteen days we had been absent, they had altered their rates in a very trifling degree. The observations during the journey were single altitudes of the sun by the circle, and from the means of various sights I hope the positions are assigned with very tolerable accuracy.

Leaving Baghdád by the Báb-al-Mo'adhdhem,* the road towards Sámarrah lies nearly N., about 17 miles over a barren plain perfectly level; the gardens and date-groves, with here and there a dome or minaret glistening through them, on the river to the right for the first part, and then an unbounded horizon for miles to the khán or carávánserái of Jedídeh. Here begin the villages of Nahr Khális, a canal flowing from the Diyálah

* The exalted gate, so named from the Tomb of Abú Hanífah (El A'dhem, *i. e.*, The Greatest of Divines) hard by. (See Niebuhr, Reise II., 294.)—F. S.

to this point on the Tigris, and vary the road for about 16 miles farther north, to the village of Sindíyah, the highest or last of the villages of Khális: two small canals or offsets from the Nahr Khális, now dry, cross the road, one at Howeïsh, the other between Jezání and Yenkícheh, or Yenícheh.* From Sindíyah to the confluence of the 'A'dhem,† there is little cultivation on the margin of the river by the Abú Keshmeh Arabs, living in huts of reeds, and tents, on the left bank, and the Bení Temen Arabs on the right; and in the low alluvial islands now left by the fall of the river. This is the general state of the banks, and I need not again describe them further than to note the change of a pebbly bottom near Khán Thóliyah for a perfect alluvial soil below.

The 'A'dhem flows into the Tigris in lat. 34° 0′ 38″, long. 7′ 15″ W. of Baghdád; its bed is now dry, being dammed up above by the villagers, to retain its waters during the dry season; it remains dry from three to five months according to the peasants' account, and when flowing into the Tigris is from 20 to 70 yards wide according to the season. The Tigris here comes from the westward, and winds a good deal above, making it probable that an army going to the northward would here leave its course, as stated by Arrian in the case of the Greeks. I looked without much hope of success for the ruins of a bridge, the river having evidently changed its course a good deal through the plain in the lapse of ages.

We found extensive ruins on the angle formed by the two rivers, and the remains of the splendid canal or Nahrawán, with branches from it; but the Tigris has evidently here changed its bed, cut into the northern banks, and probably carried away the greater portion of the city of Opis. Everywhere around are mounds of ruins, bricks, pottery, and glazed tiles. Though I have no doubt that Opis once stood here, I do not presume to say which of these mounds, or how many of them, mark its site, or how much has been swept away, in part or whole, by the gradual change in the course of the river or rivers.

The ruins are only mounds, gently rising a few feet above the desert, covered with fragments of bricks, tiles, and jars glazed or plain; leaving them, we rode to the Khán Thóliyah, which I had used as a station, and rejoined our boat in order to pursue the search for the Median Wall.

The Tigris flows from the W.N.W. and N.W., broad and broken by islands as far as the Khán of Mizrákjí on the left bank, opposite to which we found, by the assistance of Dr. Ross's journal, the Median wall in lat. 34° 3′ 30″, long. 21′ 50″ W. of Baghdád. We examined the country for some distance in the neighbourhood, found the ruins of Jibbarah, and returned to our station without

* Little New Town, a Turkish name.—F.S.

† Greater or Greatest (Canal).—F.S.

success; but some mounds on the higher level drew our attention, and, resuming our search on the following morning, we found the ruins of a strong fortress or small city, surrounded by the river Dijeïl,* and a canal from it; the natives called it Khidhr Iliyás,† from a tomb on its highest part, and I fear its proper name may in consequence be forgotten, as I have hitherto been unable to get any other. Passing this ruin, we crossed the Dijeïl, now a dry bed, and, clambering up its steep banks, came immediately on the end of an embankment or wall of lime and pebbles, having towers or buttresses on its northern or N.W. face, and a deep and wide fosse. This we called the Median wall;‡ and, putting our horses to their speed, galloped along it for more than an hour, but, finding no appearance of a termination, returned for our morning observations, taking the word of the natives that it reached to the Euphrates. Passing the remainder of the morning till noon in observations for position, we sent back our boat and mounted our horses at 2h. 45m. P.M. to follow the old course or ancient bed of the river, that from the nature of the ground appeared to have once swept the end of the Median wall and flowed between it and Jibbarah. The extensive remains of canals occurring through the whole of this country rendered this a task of more time than we could command, and obliged us to content ourselves with leaving it on our right, and proceeding to fix the position of some ruins on its left bank in the direction of the little town of Balad, towards which we were advancing. The examination of the country prevented our line of march being an accurate measure, but by bearings we were enabled to fix its position with tolerable accuracy.

The country from this to Balad, where we arrived at 4h. 50m., is strewed with ruins of various and uncertain kinds; mounds of mud, of brick, pottery, and more modern walls of gardens. The little walled village of Balad, now fast crumbling into ruins, contains about 40 houses, without counting the many which are no longer habitable; this and the little town of Suneïchah, which we shall visit to-morrow, are all that remain in the once populous and flourishing district of the Dijeïl.

After the knowledge of our arrival had gone abroad, and the wise men and elders of the town assembled round us, our conversation turned on the antiquities, and we adjourned to the top of the old Serái to survey them with more advantage: it was a

* Little Tigris; the diminutive of Dijlah, anciently pronounced Diglah, Digl, Digr, or Tigr.—F.S.

† The Prophet Elias and St. George, supposed to be a re-apparition of him, and therefore highly venerated by the Muselmáns.—F.S.

‡ I am strongly inclined on the whole to leave the great Median wall among those points respecting which it is easier to excite doubts than to obtain accurate information.—*Williams's Geography of the Anabasis.*

council of ancients, if not of antiquarians; and, as tradition was principally my object, I listened with some interest to the following statements.

"You see," said my informants, "the mound to the north-westward there; a chalú or sidd (wall or embankment) runs across to the Euphrates; it is called Mothakh, and some times Shistát: it was built by Nimrod. There is a canal; it is called the Isḥákí. This does not go to the Euphrates, but runs down through the country till it is lost near Baghdád; but there are two other canals that, like the sidd, run across to the Euphrates—one from Istábolát, near where the Dijeïl leaves the Tigris, called Jahlu-l Darb, and one that runs from this, called Bú Khaïmah." "I do not see the traces of them," said I. "No, it ran from the right bank of the river, which once flowed between us and its termination. The place you now stand upon was once an island, and is still called the Hogeïjeh (island). The Tigris formerly divided at the end of the sidd, at Khidhr Iliyás, and the ruins of Jibbarah, Tel Imsáyeh, and another ruin, Tel Dhahab, which you will pass to-morrow, were on this, the left, bank of that branch; the ruins of Khidhr Iliyás, Harbah, and Sumeïchah are on the right bank; there is also a ruin you just see at a distance to the south-westward called Tel Biyás, but the country is all covered with ruins."

Having fixed the position of Balad by bearings, we left with the dawn of the 30th for Sumeïchah, diverging from the straight course to examine more minutely the various mounds on the level plain, principally old canals; at 7h. we found the ruins of Tel Dhahab, or the Gold Mount, a modern name given to a very ancient ruin about a mile or less in diameter, and about 50 feet above the plain, now so level that we galloped over the brick and tile that cover its area. Continuing our course for Sumeïchah (the date-trees of which were visible from the mount), at 1 mile or 20m. from it crossed the old bed of the river, which can be easily traced, though dry, about 200 yards broad, running in an east direction close to us. Continuing the same course we crossed another dry bed of the river at 55m. from Tel Dhahab, or $2\frac{1}{2}$ miles distant. The direction of the river or bed is nearly parallel to that which was first crossed; from this a canal runs off in the direction of S. 65° W., Balad bearing N. 30° W., Seyyid Mohammed N. 18° W., Sumeïchah S., Súfíyah, a ruin on the road ahead, S. 2° E., distant about $1\frac{3}{4}$ miles. At 9h. 40m. A.M. we reached the gardens and villages of Sumeïchah, situated on the Dijeïl, now dry. On looking back to our morning's observations, and the information drawn from the Arabs yesterday, and in former conversations, we were much inclined to adopt the supposition that the

level plain over which we had been wandering, through ruins, this morning and yesterday, as far as the dry bed, about 3 miles or a little further on, was once an island; and that the Tigris, dividing at the end of the Median wall, swept by the ruins which we noted, some of which may be Opis, as the line of the 'A'dhem, if continued on the map, would pass near them; but I see no reason for supposing that the river did not likewise run in its present course at the same time, that is, with the variations its banks now indicate, and which are the work of a long period, during which the 'A'dhem could not have crossed it; nor is it probable that it was crossed by Xenophon: so that we may still look for Opis in the few ruins near the confluence of the Tigris and 'A'dhem. They are not so far from the end of the Median wall as materially to set aside the opinion of the geographers who place them there: my object, however, is to give facts rather than conjectures.

Desirous of having the points which I felt of the most consequence as accurately determined as possible, I did not remove the watches from the boat, and expose them to the motion of a journey by land, till another comparison at Baghdád should have given additional evidence of their rate; consequently, the positions fixed yesterday and to-day depend on theodolite, compass-bearings, and angles between fixed points. The little town of Sumeïchah, where we spent the day, contains about 200 houses: it is fast crumbling to decay. The Dijeil, which flows through it, is now dry for the greater part of the year, but the villagers told us it used to flow for nine months, and remain dry for only three. That rule is now reversed, as it flows only three months, in consequence of the falling in of the works at its head; and, though only 5000*l.* or 6000*l.* would be required for the repair of them, no one will undertake it. Everything therefore which depends on artificial irrigation is going to ruin, though the revenue of the district (Dijeïl) was farmed this year for 1,300,000 piastres. My friend Saláh Aghá, who has been the farmer, complains of having lost 500,000 piastres, or rather that he cannot pay to the Páshá more than 800,000. The inhabitants complain of the tyranny, supineness, and neglect of their governors, and all but the owners of gardens are emigrating. "If you had this country, or even Ibráhím Páshá, we should not be without water," observed an aged villager during our conversation this morning. "You would not have all these lads who are crowding together in the yard there," said an old fellow lately from Syria; "Ibráhím makes Nizám* (soldiers) of all such youngsters:

* Nizámi-jedíd (the New Discipline or Arrangement) is the name given to the Turkish army since the destruction of the corps of Janissaries. It was first applied to the corps raised by Sultán Selím III., and disciplined in the European manner by renegadoes or European officers. Nizámi-jedíd, though the words are Arabic, is a Persian compound.—F. S.

there is not a lad of their age to be seen in his villages." "He must have a few to marry," remarked the old villager. "Not a soul," replied his friend. "What do the women do?" asked the old fellow. "What do they do in Firangistán?" replied the traveller. "Why, there they have nizám of women, and don't require to have men in the villages. When their Sultán wants nizám, they bring the male and female regiments together and draw lots." The gravity with which this piece of information respecting our customs was given and received by the hearers made us smile. "Is it not true?" said the reporter of the tale. "Tell me, by Allah, is it not true?" My oaths and affirmations as to its falsehood would probably have gained little credit; but the hearty laugh of myself and my brother officers was a better and more convincing argument: so that these villagers do not now believe in that way of making English nizám.

We rode from this village in the evening to the steamer lying off Sindíyah, a distance of about 17 miles over a level plain. On starting at 3h. 40m. we passed some broken ground and ruins, possibly the old bed of the river (?), around the village, and then got into the plain. At 5h. P.M. we reached two small mounds of ruin called Agadeh (?), whence I obtained several bearings.

At 5h. 45m. another and larger ruin, level with the plain, and only marked by fragments of bricks, tiles, and a different soil, composed of rubbish instead of clay. At 6h. 45m. another of the same age and description; and at 7h. 45m. reached the steamer, where we found that our watches and instruments had sustained no injury or change during the journey. The following day was devoted to observations for rate and latitude, and the examination of the river from Sindíyah to Baghdád commenced on the morning of the 1st, merely, however, as a basis for further examination, should more important duties permit.

We found the river navigable (at this the lowest season) as high as Opis for vessels drawing less than 4 feet, and reached Baghdád on the 3rd, having fixed several valuable points, and with much regret left others undetermined, in order to pursue our duties, hoping, however, to return.

The waters of the Tigris pass through few more interesting tracts than that we have just glanced at, connected with European history in its most attractive pages, and all that is elevated and refined in Asiatic literature; and we search among the ruins that are everywhere scattered over it, with the hope of identifying some hallowed spot, whence the scholar and the soldier may look back with interest.

[Since the above was written Lieut. Lynch has completed a trigonometrical survey of the river Tigris, from Ctesiphon to Mosul, from which the annexed map has been reduced. See p. 439.—Ed.]

ANALYSES, &c.

I.—1. *Nippon Archiv voor de Beschrijving van Japan, &c.* [*Documents for the Description of Japan and Jesso, with the Southern Kuriles, Krafto, Korea, and the Liu-kiu Islands, &c.*] By Ph. Fr. von SIEBOLD. Leyden, 1832-9. Folio.

2. *Voyage au Japon exécuté pendant les années* 1823 *à* 1830; *ou Description Physique, Géographique, et Historique de l'Empire Japonais, &c.* Par M. Ph. Fr. DE SIEBOLD. Edition Française. Tom. I. Paris: Arthur Bertrand, editeur. Communicated by J. C. PRICHARD, M.D., F.R.S.

THE learned of different countries in Europe may be said to have distributed among themselves, by nations, the several regions of Asia, as the respective fields of their enterprise in literary and scientific exploration. China may be termed the province of France, for nobody will dispute the fame which Gerbillon, Gaubil, Visdelou, Premare, Mailla, Amiot, and other French missionaries of the last century acquired, and which the Chinese scholars of France, during the present age, with Abel-Rémusat at their head, have maintained. Persia also will be claimed by France, since the name of Anquétil du Perron is for ever associated with the literature of Iran and her Magian hierarchy. That literature and the monumental records of a country contiguous to this great Asiatic empire have been abandoned by Englishmen to foreigners. But in India Britain has vindicated her fame. The soil on which the black antelope feeds is the Holy Land of the Brahmans, and it is the field where England has formed her heroes to the highest glory of arms, and where all Europe envies the fame of her Oriental scholars, who, in the space of forty years, have explored the admired mysteries of the Vedas and Sastras and Puranas, and of that ancient and elaborated language which the disciples of Aristotle heard without perceiving that it was cognate with their own. In India our countrymen have unfolded the doctrines of ancient schools of philosophy, which challenge a comparison with those of Democritus and of Zeno: they have discovered a dramatic literature as refined and embellished, and nearly as ancient, as that of the Athenian stage, and they have detected the secret system of those astrono-

mical calculations which eluded the scrutiny of Baillie. What are victories over nabobs and nizams compared with that renown which is associated with the names of Sir William Jones, of Colebrooke, and of Wilson? Germany claims not one foot of land in Asia; yet her scholars come in everywhere for a large share in the honour of literary discovery. Schlegel and Bopp have taken the lead in the criticism of Indian philosophy and the structure of language, and Klaproth and Schmidt and Schott and Neumann in Chinese and Mongolian history. Lassen divides with Burnouf the fame of having first read the decrees of Darius Hystaspes on the portals of his palace, of deciphering the letters written by Ahasuerus, and the syllables which Daniel and Ezekiel were taught to spell. Even in Egypt, where the interpreter of the Rosetta inscription and his zealous follower acquired their high renown, it has been reserved for Bunsen and Lepsius to erect anew the throne of the Pharaohs on a sure foundation, and with a top reaching into the clouds of antiquity.

Holland has one empire in the East which she claims as her own field of investigation, to which she alone has access, for Dutchmen only can walk at large in Nangasaki. Since the time of Engelbertus Kæmpfer, Thunberg, physician to the Dutch embassy at Jeddo, had travelled into the interior of Nippon, and had given curious information respecting its productions. Isaac Titsingh, president of the board of trade with Japan, had collected interesting notices of that empire and the neighbouring countries, and had brought into Europe a vast collection of objects illustrative of ethnography and different branches of natural history. The calamities entailed on Holland by the French revolution interrupted for many years her commercial enterprises. When the new government recovered the Dutch possessions in the East, among the first orders given to the governor-general, Baron van der Capellen, was that of promoting the advancement of science by every opportunity which the colonies afforded. Professor Reinwardt, Dr. Kuhl, and Van Hassell, and afterwards Dr. Blume, explored the Sunda and Spice islands. The former returned to Europe with a rich collection; Kuhl died a victim to his exertions: the two last were occupied in exploring the field which Java opens to the researches of naturalists, when the attention of the government of the Dutch colonies was fixed upon Japan. The state of the factory at Desima was such as to call for immediate care; and a distinguished officer, Colonel Sturler, was appointed chief of the whole Dutch establishment at Japan. In order at the same time to promote the interests of science, and particularly in the department of natural history and ethnography, it was proposed by the government of the Dutch Indies to Dr. Siebold to accompany the expedition of M. Sturler

in the quality of physician and naturalist. We have in the splendid work, of which six livraisons have reached this country, the results of his researches during a residence of several years at Nangasaki. He had previously communicated several papers to the "Batavianisch Genootschap van Kunsten en Wetenschappen," and some to the Asiatic Society of Paris, which had been reviewed by that severe and unsparing critic, Klaproth, and published in part in the Journal of the Society. He had likewise transmitted to the latter Society a treatise of considerable extent on the history and antiquities of the Japanese people, of which they declined the publication, under the influence, as it should seem, of Klaproth; and on the ground that the author had stipulated for the appearance of his work on a scale not less magnificent than that of which Alexandre de Humboldt had published his 'Essai sur la Géographie des Plantes.'

M. de Siebold seems to have made the writings of that celebrated traveller on the New World the model of his commenced work on Japan; in which he purposes to comprise, besides a narrative of his voyage and personal adventures, every topic connected with the history of the country and its inhabitants. This will appear from the 'Uebersicht,' in which he states that his '*Nippon Archiv*' (such is the title of the work) contains treatises, extracts, illustrations, and remarks, intended to afford the most complete attainable acquaintance with the empire of Japan, and all its adjunct and feudalised territories, viz., Jezo, and the Southern Kuriles, Krafto, that is, the island improperly termed Saghalian by Europeans, Kooraï and the Liu-Kiu islands, distributed under the following heads:—

1. Mathematical and physical geography of Japan, Jezo, and the other countries, with an atlas, geographical, hydrographical, and geological charts, plans, views, and surveys.

2. Of the people and state, containing descriptions of the inhabitants of Japan, their manners and customs, constitution of government: with portraits, delineations of costume, festivals and solemn rites and usages, illustrated by plates.

Under this department of the work the travels of the author by sea and land will be comprised.

3. Mythology, history, archæology, and numismatics, with suitable illustrations.

4. Arts and sciences, languages and literature.

5. Religion, under the title of 'Nippon Pantheon.' This part contains figures and short descriptions of the principal deities, deified governors, &c., temples and cloisters, priests, ranks and names of different sects, sacred monuments, implements, and dresses belonging to the Sintoo and Búddhist religions in Japan.

6. Husbandry, manufactures, and commerce, with descriptions

of natural objects, figures of economical plants, animals, of machinery, &c.

7. Descriptions and history of all the adjoining countries, and those feudally connected with Japan.

8. Extracts in translations, or in the original text, of the old and little known writers on Japan, Jezo, &c.

9. Mixed extracts, notices, novelties, anecdotes, &c. Contributions from learned men on Japanese archæology, ethnography, to this portion of the work, are invited by the author, and will receive an unrestricted attention.

The parts of the work already published are unequally distributed between several of these sections, and some of the topics comprised in the plan are only entered upon, while others still remain untouched. Under the first head, namely, a Physical History of Japan, we have a treatise on the discovery, name, situation, extent, and subdivision of the empire of Nippon, filling 32 folio pages. To this is added an account of the Dutch factories, Firato and Dezima. These are contained in the first livraison, and they are continued in the fourth by an account of a voyage from Batavia to Japan, and the outline of a geographical and statistical description of Banka. The whole of this part is illustrated by an atlas in large folio, containing several beautiful plates of the havens, towns, and rivers in the Japanese islands, and by some charts and maps; and a similar atlas accompanies each livraison.

2. Belonging to the second part of the work we find some brief remarks on the physical character of the people in the third livraison, illustrated by seven large portraits, with an atlas, among which four belong to natives of Japan, two represent a Chinese, and the seventh is a beautiful portrait of a Bugis of the island of Celebes. To this same part are referred the accounts of the author's personal travels in different parts of Japan, occupying 88 folio pages. The history of the travels is but commenced in the German edition: it is carried much further in the French translation, of which one volume has yet been completed. The French copy of the work is confined at present to the personal travels. The atlas of this last livraison contains views of the interior of the country, mountains, volcanoes, and distant views of towns.

3. The third section, which is to be occupied with contributions to the history of Japan, is but commenced. The first part of it contains a mythical account of 'the Creation of the World,' 'Primitive History of Japan,' 'Foundation of the Dynasty of the Mikado, or Japanese Emperors,' by Zin-mu. This historical sketch is taken from native Japanese historians. The ancient people of the island, according to these documents, were barba-

rians, and dwelt in caves, like the present inhabitants of Yezo and Krafto, till they were civilized 660 years B.C., by the divine warrior Zin-mu, whom Klaproth supposes to have been a native of China.*

4. Under the fourth head we have a compendious account of some of the arts and manufactures of Japan, of their weights and measures.

5. The religion of Japan contains the pantheon of the Sintoo, or old Japanese worship of Kamis, so they term the gods of their domestic or original system of superstition, as distinguished from Buddhism, which was introduced from China.

The remaining sections of the work are yet to be looked for; the only part published is a subdivision of the seventh section on the neighbouring countries. This is entitled 'Nachricten über Kooraï,' and contains some new and curious information relative to the Corean peninsula. According to M. de Siebold, frequent communication subsisted between Japan and the southern part of Corea as early as 100 years before the Christian era, and continued during the following centuries. In the year of our era 285, the doctrine of Confucius, as well as that of Buddha, was introduced into Corea, and spread through Japan; and the Corean peninsula was in these early times the school and source of mental refinement, whence the arts and sciences were introduced into Japan, much more than from China. In later periods this intercourse was interrupted, but at present it happens every year that many fishing-boats and coasting-vessels from Corea are cast away upon the shores of Japan. The stranded crews are after such accidents brought to Nangasaki, the only port appointed for the reception of strangers, where they are maintained in a building set apart for the purpose, adjoining to the factory belonging to the Dutch; and there Von Siebold had an opportunity of making observations on Coreans of the most various ranks and conditions, for they are often detained a long time in waiting for a favourable wind from the S.E., which generally begins to blow in the month of May, before they can return into their own country. In May, 1828, there were thirty-six of these shipwrecked Coreans, of whom the most respectable, a merchant, an interpreter, and some tax-officers, were well able to express themselves in written Chinese characters.

Nouv. Journal Asiatique, tom. iii.

II.—*Reise um die Erde, &c. Travels round the World by Way of Northern Asia and the Atlantic and Pacific Oceans, in the Years* 1828-30. By ADOLPH ERMAN. 2nd vol. Berlin, 1838.

AMONG the numerous books of travels which, during the last quarter of a century, have issued from the press, it would be difficult to select one that has added more to our knowledge of geography, in its most extended and in its only correct sense, than the work before us. A devoted follower of the school of Humboldt, Professor Adolph Erman has closely followed in the luminous track of his great master, and has set an example to modern travellers that they will do well to endeavour to imitate. Fully impressed with the conviction that it is by diligent study of the physical geography of the globe that we can alone hope to obtain a correct acquaintance with its great leading features and with the laws that influence the distribution of animal and vegetable life, Professor Erman has devoted much time and labour expressly to this subject, and, although his route lay through the desert of Siberia, which might at first sight be considered a sterile and unpromising country, the result of his journey is a highly philosophical and sterling work, every chapter of which is replete with geographical information.

On a former occasion * we briefly traced the steps of M. Erman throughout European Russia, from St. Petersburg to Moskow, Kasan, and Peru, thence across the Ural mountains to Tobolsk, where he obtained accounts of the great steppe of the Kirghis, through which exists a regular commercial intercourse to Tashkend in Khokan, and of the wandering tribes that inhabit that region, with his descent of the Obi to Obdorsk, near the shores of the Polar Sea;—we have now to accompany him by a less beaten path, and therefore, to a geographer, by one of even higher interest, throughout Asiatic Russia to the shores of the Pacific Ocean.

Quitting Tobolsk in the depth of a northern winter, M. Erman travelled in a south-eastern direction across the stoneless plains that surround the capital of Western Siberia, and, gliding rapidly in his sledge over the frozen marshes of Barabinsk and the snow-clad steppes beyond, he reached the town of Tomsk, situated on the eastern bank of the Obi, on the evening of the 16th day; three days more brought him to Krasnoyarsk at the confluence of the Kacha with the Yenisei—and in this valley the improvement in soil forms a striking contrast to the sameness of the road he had hitherto travelled; a great improvement is also manifest in the style of building and in the civilization of the people.

"The low plain on which Krasnoyarsk is built is bounded by the

* Journal, vol. VI. p. 387.

Yenisei and the Kacha. A precipitous acclivity forms the northern and longest side of the obtuse point of land between the two rivers. To the east it joins on to the mural cliffs of red marl (krasnoï yar) which form the left bank of the Yenisei, and which gives its name to the town. On the right bank of the river is a plain 7 wersts wide, and bounded to the S.W. with distant blue mountains, whose lofty and picturesque outline indicates a rock formation. In the river near the town are three islands, covered with woods of acacia, quince, and plum."—p. 29.

From Krasnoyarsk M. Erman journeyed again in a S.E. direction, and, passing through Kansk, Nijneï Udinsk, in the parallel of 55°, where in the morning of the 3rd of February the quicksilver of his artificial horizon presented a solid surface; and Telma, with its gigantic cloth-manufactory which employs 800 exiles, he reached Irkutsk, a distance of about 1600 miles in thirty-three days from Tobolsk.

This chief city of Eastern Siberia is situated on level ground on the eastern bank of the river Angará, here 330 yards wide at its junction with the Irkút, in lat. 53° 14′ N., at an elevation of 1240 English feet above the sea, and about 30 miles from the north-western shore of the lake Baikal, the mean temperature for the year being —0.3 Réaum., or rather below the freezing point.

The great lake Baikal, at an elevation of 1350 English feet above the sea, extends in a N.E. and S.W. direction, about 350 geographical miles, with an average breadth of 35 miles, of which the Angará, flowing northwards to the Yeniseï and the Icy Sea, is the great outlet.

On the 12th of February M. Erman started to cross this frozen inland sea on his road to Kiakhta, the frontier-town between China and Russia. The road leads in an E.S.E. direction, by Ilinsk and Verchnei Udinsk, up the valley of the Selenga, bounded by lofty mountains, for some distance; then turning round to the southward passes by Selenginsk, and continues gradually ascending till at Kiakhta the level is 2220 feet above the sea; between Ust-Kiakhta and Troizko Sawsk, on the Chinese frontier, the barometer showed a difference of 608 feet.

In describing the physical geography of this part of the country, M. Erman says:—

"During the next 120 miles from Irkutsk towards China the ground rises 978 feet; from that spot it ascends more rapidly as far as the parallel of the Mongolian town Urga, and the elevation of nearly 3000 feet which one has there attained remains unchanged for upwards of 300 miles farther towards the S., within the barren steppe of the desert of Gobi: the road to Pekin first reaches the precipitous southern declivity of this elevated plateau, in the 42nd parallel near the town Dyan-sya-keu.

"It is this elevated dry table-land which produces the dry climate at Irkutsk: the S. winds which begin to blow in October are so dry, that

they cause the floors and other wood-work in the houses to split; and we learn from Dobell and other travellers that the N. wind produces a similar effect in Canton—these two winds having their source in this high Mongolian steppe."—pp. 67, 68.

At Kiakhta and at Troïzko Sawsk, on the borders of the Celestial Empire, M. Erman remained from the 16th to the 22nd of February; and during this time visited Maimachen, or the Chinese town, which is separated from the Russian town by a high wall, which marks the limits of the two empires. During his stay here he had an opportunity of studying the manners and customs of the Buraets, a nomade nation of the Mongolian desert, who appear to be a race comparatively wealthy in flocks and herds. The 11th chapter is devoted to these subjects, and to a visit paid by our author on his return towards Irkutsk to the Chamba Lama, the high priest of the Mongols, who dwells in a picturesque valley not far from the south-western end of the lake Baikal. The religion professed by the Mongols is said to resemble very much the worship paid to Buddha in India.

On the night of the 7th of March a slight shock of an earthquake was experienced at Irkutsk.

Again quitting Irkutsk on the 19th of March, M. Erman pursued a north-north-easterly course across the hilly country which separates the basins of the Angará and the Lena, here not 100 miles apart, till he reached the village of Kachuga on the eastern bank of the latter river. In the journey across this tract of land, of special interest, as containing the sources of the river Lena, Olsonsk was found to be 434 feet, Bagendaisk 524 feet, Kogotsk 371 feet, Mansursk 363 feet, and Kachuga only 261 feet above the level of Irkutsk, or 1510 feet above the sea. From Verkolensk, 30 versts lower down, M. Erman continued the descent of the frozen river in his sledge on the ice: his barometric measurements therefore indicate the fall of the Lena for upwards of 1000 miles as far as Yakutsk; during which he found the frozen surface at Verkolensk at 1426 feet, Tiumenowsk 1140 feet, Kirensk 780 feet, Vitimsk 595 feet, Beresowsk 448 feet, Olekma 410 feet, and Yakutsk 307 feet above the level of the Icy Sea.

From the 8th to the 23d of April, Professor Erman remained in the town of Yakutsk, a full account of which, with a comparison between the Yakut, the Tartar, and Mongolian languages, may be found in his 13th chapter. It was during his stay here that he took advantage of the opportunity afforded him by a deep well to ascertain that the ground was still perpetually frozen at the depth of 400 feet from the surface; indeed, as it was found that the mean temperature of the place was − 6 Réaumur, or + 18½ Fahr., M. Erman expresses that he could not expect to find the ground thawed until he had reached a depth of 600 feet. The

winter of 1827, which was selected for his observations, was a *temperate* winter, for in 1828 the temperature of January was − 35°.7 Réaumur, or − 48° Fahr., in the warmest part of the day, and the mercury did not thaw for *three months together*: in ordinary years it is only solid for two months.

M. Erman says:—

"The inhabitants of the Swiss Alps would with justice complain of their hard lot if they were compelled to live at a height of 10,000 feet, or 2300 feet above the Hospice of the Great St. Bernard, and there feed and warm themselves with the animal and vegetable productions of the surrounding mountains; but they would be only living upon ground of the same temperature which I have found between the houses of the shepherds of Yakutsk! And we might apparently draw the conclusion that what is impossible in Europe is common in Siberia, if we did not take into consideration that a similar temperature of soil is constituted in different places of different elements.

"Yet with this degree of cold we have at Yakutsk, which is in 62° 1′ 30″ N. latitude, as much as 123 days wholly without frost; and during this period of the year vegetable life is not only undisturbed, but is favoured and pushed forward in an extraordinary manner by a steady and rapidly increasing temperature. In mountainous countries, and in the northern regions of Europe, corn ceases to be cultivated only where the mean temperature of one of the three summer months is below + 7° Réaum.; but in Yakutsk, in the months of June, July, and August, we have a mean temperature of + 11°, + 15°, and + 13° Réaum., and very often the thermometer in the shade shows + 20 Réaum. (77 Fahr.) In the year 1827 this was the case for 44 days.

"This powerful influence of the sun is very sensibly felt by the inhabitants: several kinds of grain, and particularly a summer wheat (jänza), and rye, are sown by the Russians in the vicinity of the city. The country is then thawed to a depth of 3 feet below the surface, and, while it rests on strata in a state of perpetual frost, it yet produces on an average fifteen-fold, and in some cases forty-fold. Mr. Amwrossow, the chief priest of Yakutsk, assured me, that the cultivation of corn would be very much increased if they could divert the Yakuts from a nomadic life. It seems that this extraordinary fertility of the soil is owing, partly to its composition, which is entirely alluvial, partly also to the effect of the frost in rendering it fertile and friable, and in part to the water, which in the spring trickles over the whole surface, and which finds no escape through the frozen strata below. In the gardens of the city they rear potatoes, cabbage, many kinds of esculent roots, radishes, and cucumbers; but the grasses are of still greater importance, for the support of the Yakut flocks and herds: we may mention also the magnificent forests of larch to the east of the city, where are found in abundancee fur-clothed animals, and wood for building as well as for fuel."

Quitting Yakutsk on the 23d of April, M. Erman kept in an easterly direction across the Aldan mountains, towarks Okotsk.

From the valley of the Lena the ground at first is hilly, and, although both Talbuyaktask at 18 miles, and Tagulinsk at 30 miles, are from 50 to 100 feet lower than Yakuzk, the rise from this latter point is continual but gradual to Nokinsk, on the heights forming the western banks of the Aldan river, where it attains an elevation of 750 feet above the sea, whence it falls rapidly to the valley of the Lena, which at Aldanski Perevos, on its eastern bank, is 422 feet above the sea. At Lebegine, a village half-way between these two rivers, and 614 feet above the sea, M. Erman found its latitude to be 62° 11′ 30″, or 10 miles to the northward of the parallel of Yakutsk: whereas in the latest maps it *was* (and in England it is to be feared we must still say it *is*) laid down 51 miles to the southward of that place; and this occurs on the high road to Okotsk, which may serve as a sample of our ignorance of the geography of these regions, and of the value of a journey undertaken by so intelligent an observer as M. Erman, throughout his travels, has proved himself to be.

On the eastern banks of the Aldan river the mountain-range, which derives its name from the stream. rises with a steep ascent. At a night's halt, four versts beyond Bielski Perevos, it is 762 feet, and the following heights above the sea were observed on the journey:—

	Feet.		Feet.
1st mountain E. of Perevos	970	The lake Tungor	2442
2nd idem	1500	Mountain-pass 5 m. W. of Koinya	2608
Chernolyes	985	Koinya	2238
Garnastak	1530	Kapitan (highest point of Aldan mountain)	4263
Allakyuna	1912	Ketanda	2750
Ulagchan	2710	Aiki	908
Larch forest (limit of)	2240	Meta	166
Single larches	2494		
Ancha	2391		

Okotsk, 13 feet above high water in the Pacific.

From Mount Kapitan, the highest point of this part of the Aldan mountains, the ground continues at a level of about 2500 feet as far east as Ketanda, about 100 miles from Okotsk, whence it descends rapidly to the shores of the Great or Pacific ocean.

Vast forests of larch *(Pinus larix)* clothe the sides of the Aldan mountains, and, in the latitude of 61° N., attain an elevation of 2240 feet; fine single trees reach to 2500 feet; and on Mount Kapitan M. Erman hung his barometer up to a tall and well-grown larch tree, at 4028 English feet above the sea!

In their geological character, the Aldan mountains, where M. Erman crossed them, may be divided into three principal groups, namely, limestone from the valley of the Aldan to the sources of the Biela; greywacke from thence as far as Ketanda; and the porphyry-formation, with sienite and granite, from Ketanda to the level of the sea.

From Yakutsk M. Erman travelled with horses under charge

of his Yakut guides for about 200 miles direct distance, as far as Garnastak on the western side of the Aldan range: he here changed his mode of travelling for the fleeter reindeer, and with a herd of twelve of these noble animals pursued his journey through the mountain-range under charge of a Tunguse guide. Shortly after reaching the eastern foot of the range, our traveller exchanged his reindeer for a long train of Chukchi dogs, which dragged him down the rather rapid descent from Arki to the shores of the Pacific Ocean.

Our limits forbid us to follow M. Erman to the peninsula of Kamchatka, which we the less regret as we have not yet received the personal narrative of his journey, and, as he has himself given some description of the geological formation of that country in a letter (printed at p. 500 of this volume) which accompanied his donation to the Society of a well-executed map of the peninsula of Kamchatka, on the scale of three miles to a degree, drawn by M. Reinhard of the Royal Cadet Corps, and embodying, besides all other correct data, the observations made by Professor Erman himself on this remarkable journey.

III.—1. *Le Pilote Français.* 4^me^. *partie.* Paris, 1839.
2. *Exposé des Opérations Géodésiques exécutées de* 1829 *à* 1838, *sur les Côtes Septentrionales de France.* Par P. Begat, Ing. Hyd. de la Marine. Publié par ordre du Roi. 4to. Paris, 1839.

Among the various branches of geography there is none that is carried forward more steadily or more unobtrusively, while at the same time it will yield to none in the importance of its labours, than the hydrographic survey of our channels, coasts, and harbours. Hydrography may have no brilliant discoveries to record—can hold out no El Dorado to cheat her followers into forgetfulness of their toils; but it has the gratification of conferring a lasting benefit on the human race, as exact hydrographic detail is essential to the preservation of life and property—is the only safeguard to the navigation and commerce of this maritime nation—and the geographer cannot but feel a debt of gratitude to those who expose themselves to numerous privations, and not unfrequently risk both health and life, in advancing this valuable branch of the science he desires to promote.

In the second part of a memoir, published in 1829 by the title of *Exposé des Travaux,* &c., M. Daussy has already made public the geodesic operations which have served as bases for the plans and charts of the three first parts of the new "Pilote Français," comprehending the whole of the western coast of France.

In the *Exposé* now published are briefly recalled the steps which this hydrographer followed in calculating, according to his observations, the distances and geographical positions of the points, the *ensemble* of which forms the long chain of triangles that extends from the Isle of Ushant, near Brest, to St. Sebastian's, in Spain: this is followed by a detailed analysis of the work of the same kind executed by M. Bégat on the northern coast of France.

Notwithstanding the precision with which the examination of the western and northern shores had been executed by the nautical surveyors, it was requisite, in order to combine their labours, to cause them to rest upon a net-work of great triangles, measured with much accuracy, along the whole of the coast under examination. M. Daussy was intrusted, in 1816, with the execution of this important work, by M. Beautemps-Beaupré, to whose direction the government had confided the survey of the western and northern coasts of France.

For this purpose M. Daussy selected, provisionally, as a base, the distance from Crozon to Peneran, on the coast of Brittany, which was afterwards corrected and verified by comparison with the chain of triangles carried over the country by the ingénieurs-géographes of the Dépôt de la Guerre. When at a subsequent period, in 1829, the nautical surveyors began again, at St. Malo, the works relative to the examination of the coasts, they at once took as their bases the points determined by the surveyors of the War Department, and thus connected the whole of their hydrographic labours with the grand survey of the kingdom. This latter work was commenced by M. Daussy; he was succeeded in the following year by M. Bégat, who has continued the examination of the coast from that time till the present day: the result of which, contained in the 4th volume of the "Pilote Français," is perhaps the most beautiful specimen of hydrography ever published: it does honour to M. Beautemps-Beaupré, under whose direction it was planned, and to MM. Daussy and Bégat, and the other officers who have so ably carried into execution the work intrusted to their charge. For a copy of this splendid national work the Geographical Society is indebted to the liberality of Admiral Halgan, Director of the Dépôt de la Marine, as it has already been indebted to his predecessor in that distinguished situation for the three former folio volumes of these admirable charts.

One of the first steps in recommencing the survey was to connect the isles of Guernsey, Jersey, &c., with the French coast; and M. Bégat gracefully acknowledges the attention and assistance received on this occasion from Captain Martin White, R.N., who had just finished a nautical survey of the islands. The instruments used by MM. Daussy and Bégat were a repeating

circle and theodolite of 8 inches diameter by Gambey: their angles were repeated not less than forty times, and the mean of the observations used.

M. Bégat regrets that in carrying on the series of triangles along the northern coast he had not time to measure the height of the remarkable capes, headlands, &c. This omission, it is to be hoped, may be remedied when the land survey in detail reaches the coast, or it will take away from the utility of the charts, as far as sailors are concerned. A more important point would seem to be the omission of some of the lighthouses; as, in the chart and plan of Cherbourg, the lights which, according to the published list, stand on Fort Royal, Fort Central, and Fort de Querqueville, do not appear in the engraving. The practice of giving the soundings in feet instead of fathoms will, it is to be feared, puzzle any but a French sailor.

Commencing to the west, M. Bégat mentions the operations executed near Ploumoguer, the point of departure, and recapitulates the detail of all the triangles between Brest and Dunkirk which are given in one general table, stating the point of observation, the observed angles, the mean angle, and the length of one side; according to this table, the three observed angles of the triangle, after deducting the correction for spherical excess, are in no case more than 12 seconds of space in excess; on the contrary, the entire circle and the error is usually less than 5 seconds: such creditable publicity given to the details lead us to place the fullest confidence in the results obtained.

This table is followed by another extending over 11 pages, containing the accurate geographical positions of 1000 remarkable points on the northern coast of France, being the result of the geodesic operations from the year 1829 to the present time.

The charts contained in the "Pilote Français" consist of 17 particular charts of the coast, and 11 plans of ports, roadsteads, &c., extending from l'Ile Brehat to Barfleur, the former on the scale of about 2 inches to a mile, the latter varying from 4 to 6 inches to a mile: besides these, there is a series of views of headlands, &c., taken from the several *dangers* along the coast, drawn according to scale, the rise of tide, and time of high water, &c. &c.: among the conventional signs, the mode of marking on a chart whether a rock is dry at high or low water, &c., seems well imagined, as it is a point very difficult to represent by depth of shade.

It is difficult to close so beautiful a volume as that before us without a feeling of regret that in this country we have no similar work: from the acknowledged character and ability of the numerous officers employed in the survey of the coasts and seas of

Great Britain, there can be little doubt but that their work would equally stand the test of examination, and even in some points their charts might be considered by the mariner superior in practical utility to the elaborate French volume: surely then it is much to be lamented that the surveys of our coasts should not be carried forward and published on a similar systematic plan, and engraved on a large scale, and that the whole of the data on which they rest, were it only in justice to the officers employed, should be made easily accessible, in order to enable those who are competent to form some judgment of the accuracy of the survey represented on the chart, and such as geographers in the present day are entitled to expect.

In conclusion we must be permitted to repeat that, taken as a whole, the "Pilote Français" is the most perfect specimen of hydrography it has fallen to our lot to examine; and France may be justly proud of her corps of *Ingénieurs Hydrographes,* with the venerable M. Beautemps-Beaupré at their head, who have the judgment to plan, and the ability to carry into execution, such a splendid national work.

IV.—*Reise in Abyssinien.* [*Travels in Abyssinia.* By Dr. Edward Rüppell. 2 vols. 8vo., with 10 plates. Frankfort: 1838.] Communicated by W. I. Hamilton, Esq., Sec. G.S.

The first volume only of this work has yet reached England, but it may be considered due to the character of Dr. Rüppell as a scientific traveller, so well established by his former travels in Nubia and Kordofán, no less than in consequence of the Royal Premium for the advancement of geographical science and discovery having been awarded to him by this Society, to give a short analysis of his work without waiting for its completion. It is much to be regretted, however, that it is not accompanied by the map, which is to appear with the second volume, since all the maps of Abyssinia, as yet published, appear to be extremely incorrect.

Dr. Rüppell returned to Europe in 1834, having spent above two years in Abyssinia: his pursuits were not only geographical and statistical, but were also directed to natural history. He found the difficulties of penetrating into that country much diminished since the time of Salt and Bruce, but the work of MM. Combes and Tamisier, he says, is most unsatisfactory. They were the first Europeans who for 200 years had gone beyond the province of Gojam, and visited that of Shoa: yet they have only implicitly copied the sketch of a map of that country, which Salt

had compiled merely from hearsay, and have published it as made from their own observations! Von Katte, the only other traveller, has done nothing more than copy their map with all its errors.

Dr. Rüppell has yielded to the general wish of publishing this work in the form of a journal, and not of detached essays upon scientific observations like his former work on Kordofán, &c.

He expresses a strong wish to be made acquainted as soon as possible with any information extant respecting old Abyssinian coins which may exist in any private or public collection, and says that he has everywhere been obliged to take up the defence of Bruce against the attacks of Salt.

Passing over the three first chapters of Dr. Rüppell's work, which are devoted to an account of Egypt and of its present ruler, Mohammed 'Alí, and which our limits forbid us to touch upon, we come at once to the narrative of his excursion to Arabia Petræa, the chief object of which was to ascertain by barometric measurements the height of the different mountains, forming the remarkable promontory of Mount Sinaï, respecting which many mineralogical and geological details of much interest are given. Having ascended to the summit of Mount Sinaï, he confirms the exactness of Burckhardt's description of the view from thence, and he found its elevation to be 7498 English feet above the level of the sea. On the 7th of May, the time when he ascended, the rocks were partly covered with numerous alpine plants in flower. The following day he visited Mount Horeb, where he found less vegetation than on Sinaï: its height is 8593 feet; while the convent of the Forty Martyrs is 5720 feet above the sea. His next ascent was Jebel Serbál, the height of which he found to be 6760 feet. Here his guide pointed out to him the footsteps of a leopard which had established itself here for several years, living on the wild goats. On his return to Tór, he obtained from the *Amherst* a tracing of the chart of the Red Sea by the officers of the East-India Company's surveying vessel *Palinurus*, the examination of which confirmed him in his opinion of the position of Myos Hormos in lat. 27° 30′, and not 24° 40′, as assumed by Professor Reichard.

Chapter V. describes the journey from Cairo to Jiddah. At Suez, Dr. Rüppell met with the pilgrims returning with the cholera from Mecca, where it had raged so violently in that year (1831) that 50,000 men perished in a fortnight. Between Tór and Rás Mohammed he made some observations respecting the coral banks which abound there, and which are more elevated above the surface of the water at the northern than at the southern extremity of the Red Sea. At Moweïlah, on the coast of Arabia,

he found ten small vessels loading with charcoal, burnt by the Arabs." In consequence of this, the supply of wood on that coast will soon be exhausted. He then continues to describe the different places at which he stopped during his voyage down the Arabian shore. Here he found, as afterwards in Abyssinia, Nubia, and Kordofán, the plant of *Pavetta longifolia,* the roots and young shoots of which are used by the inhabitants for toothbrushes. He also found that the harbour of Wushk, although safe, is not so extensive as represented in his first voyage. On the 31st of July he reached Jiddah, having left Suez on the 13th of the same month.

Chapter VI. describes Jiddah and its neighbourhood, and his voyage from thence to Masawwah. The population of Jiddah, when there are no pilgrims there, he estimated at 22,000, instead of 40.000, as formerly. Dr. Rüppell remained some time here to observe the numerous objects of natural history which abound in the Red Sea.

Leaving Jiddah on the 9th of September, after a vain attempt to visit Táifah, Dr. Rüppell reached Kenfadah on the 11th. This place had suffered much since his former visits.

From thence he steered across to the Abyssinian coast, which is protected by numerous coral banks and an endless labyrinth of islands, and reached Masawwah on the 16th, where the ship was nearly burnt before he landed, by the gross carelessness of his Turkish companions, by which he would have lost all his books, instruments, &c., amounting to nearly forty cases.

In Chap. VII. he describes his stay at Masawwah, and excursions in the neighbourhood, and gives an account of the manner in which it passed from the hands of the Abyssinians into those of the Turks. This is followed by a large account of the taxes and revenues of the island of Masawwah, the customs of which annually amount to forty thousand Spanish dollars. The trade is chiefly carried on with Jiddah, and the annual value of the exports is stated at above two hundred thousand dollars. The place is visited by many native East Indian merchants. Dr. Rüppell then describes the moral and social state of the inhabitants, and says that beggars are numerous, and robberies and theft frequent. He then mentions the diseases, water, provisions, fisheries, and climate. There is here, as elsewhere, in hot climates, generally a land-wind by night and a sea-wind by day.

Along the coast towards the N. are the ruins of several buildings of no very great antiquity: one of these places is called El Jerrar, near which he concludes the ruins of the old town of Saba should be found; if indeed Masawwah itself should not be looked upon as its representative.

Near Masawwah to the W. is a small flat island, called Dowal-

hat, the burial-place of Abyssinian Christians, and where Dr. Hemprich was buried in 1825. The town of Arkíkó is situated rather farther off to the S., and is inhabited by an idle population, whose social and domestic habits are described, as well as the government of the Náïb, who exercises a very equivocal kind of authority over the neighbouring districts.

Chapter VIII. commences with the author's preparations for his departure for Aïlát, the chief village in the valley of Modat, on which occasion the Náïb did not show much delicacy in the way of asking for presents. He then describes the country from Masawwah to Jerrar, and thence to the W. At the villages of Hetumlo and Mokullo most of the merchants of Masawwah have one of their wives and children and slaves to supply them with the necessary quantity of milk and wood. In proceeding to the westward, igneous and volcanic rocks abound. By a very winding road the distance from Masawwah to Aïlát is about 30 miles, but the direct distance does not exceed 20. The inhabitants of Modat are Ethiopians and Mohammedans, but live on good terms with their Christian neighbours. Here Dr. Rüppell could obtain no information respecting the remarkable insect mentioned by Bruce, called *tsaltsalya*, said to be so destructive to cattle. He then describes the dwellings and habits of the inhabitants; and the natural productions and wild beasts of the valley of Modat, which he saw in great numbers. Hot springs occur at a short distance to the west. The author then returned to Masawwah; and concludes with the curious details of a marriage ceremony, to which he was invited by the Náïb of Arkíkó, after having been laid up for six weeks with sore feet.

Chapter IX. contains an account of the author's residence in the island of Dahalak, a flat coral island, once a place of considerable importance: all its trade has now left it, and the only occupation of its inhabitants is the pearl-fishery. Dr. Rüppell was successful in obtaining here a specimen of the curious animal, the *dugong*, a species of walrus, which is found along the Abyssinian coast, and is taken in great numbers by the Danákil,* a wild and independent tribe of fishermen. It is sought after for the sake of its long and beautiful tusks; its thick skin also makes good sandals. Earthquakes are frequent at Dahalak; and extraordinary cracks appear in the surface of the coralline rock, which contains numerous fossils.

In Chap. X. the author gives an account of an excursion to the ruins of Adulis, situated at the head of Annesley Bay. He left Arkíkó on the 29th January, 1832, with the son of the

* The plural of Dankalah, probably the same word as Donkolah—pronounced Dongolah.

Náib as his guide. After 7 hours' march due S., their direction became more easterly. To the S. volcanic hills rose out of the level plain. They halted the first night at Afté. From thence they proceeded to the village of Gula, 2 miles to the N.E.: between these two are the ruins of Adulis, still called Adúlé. Here were a few square columns and capitals, but no inscriptions or sculptures. The latitude of Adulis was found to be 15° 15′ 44″ N. Dr. Rüppell, who is the first European that has visited these ruins, was surprised to find them at a distance of 3 miles from the sea, but this agrees with the account given by Arrian, in his Periplus of the Red Sea, who says the town was 20 stadia from the sea. On his return to Masawwah, the traveller became acquainted with a distinguished Abyssinian merchant, Getana Meriam, lately arrived from Gondar, from whom he obtained much useful information respecting his future proceedings, and an account of the then political state of the country, which was a prey to anarchy and civil war. Besides these serious difficulties, he was delayed by the exorbitant demands of the Náib of Arkíkó.

On the 29th of April, 1832, Dr. Rüppell quitted Arkíkó for Halaï, in company with a caravan of Abyssinian merchants. In the valley of Gatra, where they halted the first night, he found a stream of lava flowing down a valley in the rocks of mica-schist, out of which it had issued. He then describes the dress and habits of his Abyssinian companions: their mode of dressing their heads resembles that which appears on the statue of Jupiter Ammon. Their direction was S., passing through the valley of Saba Arega, between Mount Gedam to the E., and the Taranta mountains to the right, or W. Getana Meriam was in the daily habit of retiring from his companions to read a chapter of the gospel, a constant practice amongst the Abyssinians; but, as Dr. Rüppell says, done only, it is to be feared, from a motive of pharisaical hypocrisy.

Proceeding still southward, and leaving the direct road to Aksúm on their right, they met with several parties of the Shoho tribe, who, under the garb of hospitality, proved to be little less than regular thieves. On the 1st of May they reached the Shoho village Hamhamo, to the E. of Salt's route. The Shohos are all nomadic, and do not exceed 300 men. The next day they began ascending the narrow valleys which lead up to the summit of the Taranta passes, and their direction continued S.S.W. Excellent hones were found in these mountains near one of their halting-places: also new species of trees; some fine sycamore-fig-trees (*Ficus sycomorus*), and two species of monkeys. At Tubbo they saw several strings of oxen carrying salt into Abyssinia; thus are the N.E. parts of Abyssinia, as far as Aksúm, supplied.

The rest of Abyssinia procures its salt from the dried-up salt-lake in the plain of Táltal, where it is cut out in small pieces 8 or 9 inches long, and then used as small change throughout this country.

Instead of taking the road by the Asubo valley, which Salt followed in 1804, and which also leads to Halaï. the caravan now kept a road farther south by Mahio: here the road became too bad for the camels, for the way led up narrow passes, the rocks were perpendicular, and the country bare and dreary, without even the sound of a single stream. On the 4th, a slight shock of an earthquake was experienced. The following day they continued ascending, the Shohos, the bearers of their goods, all keeping perfect silence, not singing, as mentioned by former travellers. Among the plants of this country, Dr. Rüppell describes several quite new to him, but mimosa was still the most frequent. On the 7th their route was due west, and after reaching a small plain on the summit of the hills where was a little arable land, they crossed a stream flowing westwards into the district of Maleb, which is lost in the marshes in the N.W. parts of Abyssinia, and presently descended a little to reach Halaï. This village is a miserable place, containing 400 inhabitants, of which two-thirds are Christians, and the rest Mohammedans; they lay heavy contributions on all travellers. The character of the people resembles that of the Saortu's, and their language is the Tigré. The height of this pass was by barometer 8625 feet above the sea, and its latitude 14° 59′ 37″ N. Towards the west the country was an elevated undulating plain.

The caravans no longer pass through Dikṣán. Water is very scarce here, as also are beasts of burthen: at Halaï they could not even get the number they required.

On his journey from Halaï to Ategerát, instead of following the direct route by Adowah, Dr. Rüppell joined Getana Meriam and others in going round by Sanafé and the province of Agamé, in consequence of the disturbed state of the country, and determined to decide upon their route to Gondar, from thence, according to circumstances. They left Halaï on the 10th of May, and at some distance, after passing a large village called Dera, he was told that the church there contained a block of marble with an inscription in European characters, and heard afterwards of other ruins off his line of route. Our limits will only permit us to allude to all the objects of interest here mentioned, as the whole of Chapter XII. is full of animated descriptions of the geology, physical geography, and natural productions of the country, and of the habits and customs of the inhabitants. Ategerát is the capital of the province of Agamé, and all the streams and

valleys between it and Halaï flow eastward into the Red Sea. At Senafé, speaking of Aïto Alí, the faithful, but ill-used companion of Coffin, and who, being a Mohammedan, was the collector of customs in Agamé for the Detyách Sabagadis, he says that all the Abyssinian chiefs employ Mohammedans in all situations which require truth and honesty, on account of their superiority, in a moral point of view, to the Abyssinian Christians. While delayed in the valley of Barakit for several days, he made an excursion to Gunna Kuma, to visit a curious spring and a chapel, in which were old Abyssinian manuscripts. A remarkable feature in this journey are the numerous duties and tolls which were levied at every place they passed through. From Barakit their direction was S.S.E. for 2 days, and then S.S.W. The rivers at Omfaïto, still flowing E. into Amfilah Bay, being only 2½ days' march distant. He reached Ategerát on the 26th of May; the country throughout consisting chiefly of sandstone, clay-slate, and trap-soils.

Chapter XIII. contains an account of his stay at Ategerát, and his journey from thence to the river Takazzé. Here he received but little encouragement from the missionary, Gobat, who told him "All Abyssinians were rascals, without truth, gratitude, or faith." He found the latitude to be 14° 16′ 26″ N., and its elevation above the sea about 8180 feet. The mountains which form the water-shed between the Takazzé and the Red Sea are still to the W. of Ategerát, but not distant. The palace built by Sabagadis is nothing but a great barn: the number of inhabitants about 2200; and our author adds some amusing accounts of the manners of the Abyssinian nobility. They left Ategerát on the 28th May, Dr. Rüppell having been nearly detained there by order of Detyach Weled Michael. The roads were bad and rocky: the next day they passed a stream of basaltic lava; and a steep and dangerous road led down into the romantic valley of Saheta. Here the water flowed S.W. into the Takazzé, and nature assumed a totally new character; but they were soon attacked by armed natives, and compelled to pay tribute. Rain became frequent, almost daily, about noon; and they continued for several days down this plain, in a S.S.W. direction, bounded to the E. by a perpendicular wall of rock, several hundred feet high, while to the W. they first saw the snowy tops of the mountains of Simen on the 1st of June. They reached Takheraggiro on the 8th, when they were again delayed. This place is chiefly inhabited by Mohammedans.

The latitude of Takheraggiro is 13° 39′ 32″ N., and its elevation 6347 feet above the sea. 'Here he unfortunately dismissed the porters whom he had brought from Halaï, and no others were

to be procured. On the 16th June they again set out in a W.S.W. direction; and on the following day all traces of cultivation had disappeared. Ten leagues from Takheragiro they reached the river Geba, a rapid torrent. Fodder for their beasts was scarce; but birds were abundant on the picturesque banks of the river. From thence they reached Takazzé through a difficult, rocky country, the real distance being only about 2 leagues W.S.W.

Chapter XIV. contains an account of the journey from the Takazzé to Anjetkat, in Simen. The Takazzé is here a very rapid stream, its periodical risings being uncertain. A remarkable fact here mentioned is, that the height on the banks of the river was only 2998 English feet above the sea. A year later another observation in Shiré, 25 leagues N.W. from this spot, gave only 2774 feet above the sea; whereas Humboldt and others had calculated the height of the Nile, even in Sennár, at 4000 feet, which must be very far above the real height. The physical geography of the country is everywhere described with great care, as well as the geological formations. In addition to the natural barrenness of the soil, the few plants were destroyed by swarms of locusts. They left the Takazzé on the 21st June; but the next day the natives again opposed their progress, throwing masses of rock down upon them, and attacking them with slings, to enforce payment of tolls. This country is called Talemt, and is poor and barren, rocky, and ill supplied with water. Volcanic rocks were frequent, and boulders of basalt filled the beds of all the streams. Dr. Rüppell, however, defers his geological remarks until he gives a description of the province of Simen. Vegetation improved as they ascended the lofty chain of hills to the S.W., up the valley of the Ataba river, which afterwards flows N.W. into the Takazzé. At Ataba the basalt had taken a beautiful columnar structure. Goitres were common here, possibly from the use of snow-water. Higher up, the Ataba, flowing from W.N.W., is joined by the Abana, coming from the snowy mountains to the S.W.

On the 1st July, near the summit of the Selki pass, they were stopped by rain, fog, and snow, close to them, and no provisions but what they had with them could be obtained: it was difficult and dangerous. The height of its summit was 12,684 English feet above the sea, and forms the boundary between the provinces of Simen and Talemt. The view from this elevation was very striking; but high as these mountains are, they do not form the culminating line between the Takazzé and the real Nile, which is farther W. No disagreeable effects were felt from the great elevation. On the 5th they continued their route towards the still higher point of Buahat, in the direction of S.S.W.; and

at night everything froze around them. The following day, after a fatiguing journey through snow and rocks, they reached the top of the pass, which was 13,937 English feet above the sea. The real summit of the mountain was about 500 feet higher. The account of their journey is full of interest. On the 8th they descended still S.W. into a more fertile country; and after a march of 2½ leagues reached Anjetkat.

Chapter XV. contains the narrative of the author's residence in Simen, (which is the most mountainous and the most elevated province in Abyssinia,) and full details on the geography of the country. There is a great want of trees, but it is well peopled. None of the volcanic formations show any traces of a crater, but lava and trachyte appear frequently. The villages are chiefly small, and the habitations are dirty, diminutive, straw huts. Here, also, it is usual that whoever helps another to food should taste it himself first, to show that it is not poisoned. Their habits, as described at a feast given by the governor, are not remarkably cleanly: the volume concludes with an account of the treatment the traveller met with from the Abyssinian governor.

From what has been already said, it is evident that numerous geological details and notices of productions in natural history are mixed up with the personal narrative; and the geographical description of the country throughout the work, which, together with the ethnographical accounts of the inhabitants, will be read with interest: but there is much which it was impossible to introduce, or even allude to, in this short analysis; for nothing but a translation could do justice to it. Many readers, who take an interest in the physical geography, the natural history, and the present state of Abyssinia, will unite with us in hoping that the second volume of Dr. Rüppell's narrative will soon appear.

MISCELLANEOUS.

I.—*On the recent Establishment at Port Essington, on the Northern Coast of Australia.* Extract from a letter of Captain Sir J. GORDON BREMER, Royal Navy. Communicated by Sir JOHN BARROW, Bart., F.R.S.

THE interest which the members of the Royal Geographical Society appear to have at all times taken in receiving any new and additional information regarding our Australian colonies induces me to send you a brief account of the progress made by Captain Sir Gordon Bremer, in the formation of a new establishment at Port Essington, on the northern coast of Australia. It is brief, but its brevity is owing, as he states, to the doubtful certainty of its speedy arrival; and that a more detailed one is on its way.

The prospect held out in the Captain's letter is flattering: it affords every reason to believe that it will be carried on successfully to the completion of the settlement, and that the accomplishment of the national benefits, in the view of which it was undertaken, will be fully realised. There is no fear, I trust, that it will experience the fate of that untimely abandonment which befel the two former infant establishments on the same coast; namely, Melville Island and Raffles Bay; which were hastily broken up from the dislike of the military officers in command, with the single exception of one (Captain Barker), and the misrepresentations made to the Governor of Sydney. All this was fully substantiated by the reports of Captain Laws, of the Royal Navy.

The alleged causes which led to this abandonment were, 1st. The unhealthiness of the climate. 2nd. The hostility of the natives. 3rd. The non-visitation of the Malays. Now every one of these allegations was proved to be utterly without foundation. Dr. Wilson and all the medical officers agree in their testimony to the extraordinary salubrity of the climate—the natives, after some slight encounters at first, became most pleased and friendly, were in constant communication, made themselves useful, and deeply deplored our departure—and, as to the non-visitation of the Malays, Captain Laws reported to the Commander-in-Chief of the Indian Station, that, between the 23rd of March and the 10th of May, 1829, *thirty-four prahus*, manned by 1056 *persons*, visited the settlement of Raffles Bay; and their captains all said that a much greater number would arrive in the course of the next season; expressed their great satisfaction at the prospect of a permanent British settlement on this part of the coast, and their gratitude for the friendly reception they had met with from the settlers. The next season, however, presented to them nothing but desolation.

One of the objects in fixing upon this part of the coast was to afford to these people the advantage of trading with us for British articles of commerce and manufacture, which they could only receive from the Dutch at extravagant prices; and they expressed the great advantage they were likely to derive from having the opportunity of sending direct from hence, to China, through Singapore, their *trepang* (sea-slugs), which they fished for on this coast. It is gratifying to find that Captain Bremer met with several of these *prahus*, and heard of about thirty being in the immediate neighbourhood.

Dr. Wilson says that when the establishment was broken up the garden at Raffles Bay was in the most flourishing condition; that it contained orange, lime, and lemon-trees, bananas in abundance, shaddocks, citrons, pine-apples, figs, custard-apples, pawas, tamarinds, dates, cocoa-nuts, arrow-root, sugar-cane, peaches, pumpkins, sweet potatoes, turmeric, capsicums, black pepper, and many other useful and ornamental articles; and all these within three years.

It must be obvious to every one that a coast so situated in relation to the Dutch Archipelago and to the shores of India ought not to be left open to any European or Asiatic power that might find it convenient to avail themselves of our absence, and establish a settlement that in a little time might prove another Singapore. Contemplating the future destiny of Australia, progressing, as it rapidly is, in population, wealth, and strength, it is most desirable that the whole of this great continent (for so it may be called) should be held under one undivided power, and that Great Britain, which first planted colonies on its shores, should be that power; and that, to keep it in secure possession, she ought to draw a ring-fence round its whole coast.

John Barrow.

"*Port Essington, 9th February,* 1839.

"On the 27th October, 1838, I reached this place, and, after due consideration, fixed on this spot for the settlement. Our operations commenced on the 3rd November, and have proceeded with so much vigour that we have now a very admirable little town.

"The position is on a considerable piece of rising ground, midway on the western side of the inner harbour. The soil around is of the finest description; and we have already four wells sunk, which afford abundance of water. A finer harbour is scarcely to be met with in the world.

"The *Alligator* and *Britomart* lie in 18 feet at the lowest water of spring-tides, within hail of an excellent pier, which extends 100 feet. On Point Record and Spear Point are wells where ships can water most expeditiously, while around our settlement are large ponds and many running streams, all excellent.

"The rains have fallen but slightly this season, and our gardens in consequence have not made that progress I had hoped

for; nevertheless, the orange, lemon, banana, plantain, and cocoa-nut trees are in beautiful order; while the pumpkins, melons, &c., give ample promise.

"As regards climate, I have no hesitation in expressing my opinion that it is as fine as any tropical one in the world. We have had very hard labour, and been constantly exposed to the sun; occasionally the thermometer in the shade has been 98° and 100°; yet not one serious case of sickness has occurred. Some disposition to scurvy in two individuals had manifested itself, but by timely means it has been overcome. We have now a stock of cattle for a month, and I look for a further supply on the return of the schooner *Essington* from Timor. That vessel sailed in December last for the islands to the northward, for the purpose of opening a trade; and on board her I sent Mr. G. W. Earl, whose interesting account of his voyage is amongst my other reports. He found a considerable Christian population, under the guidance of some intelligent Dutch missionaries, and has given me so much information, and caused such a desire on my part for more, that I purpose proceeding to Little Moa and Kissa in the *Britomart* about the end of this month. My absence will probably not exceed fourteen or sixteen days; and on my return I hope to find the ship from India, by which I trust I shall be able to give a further account of these highly-interesting islands.

"In concluding this brief despatch I feel that I am abundantly warranted in congratulating the British government on their having caused the occupation of this noble harbour, and on the acquisition to the country of a colony which must answer all the purposes contemplated by Her Majesty's government in its formation; nor can I entertain a doubt but that, with the due encouragement it will receive from home, its admirable geographical position will excite attention, its capabilities for mercantile purposes be appreciated, and its soil, which evidently will produce the most valuable articles, be speedily and successfully cultivated."

[By more recent accounts from Sir G. Bremer, dated 8th of March, we learn that he had returned from his visit to the islands, and that the little colony was still going on favourably. The despatch was accompanied by a chart of Port Essington, by Captain Owen Stanley, R.N., drawn on the scale of two inches to a mile, giving all the soundings, &c.: from this it appears that the site of the new town of Victoria, on the western side of the harbour, is on a peninsula, about 70 feet above the water, about 4½ miles from the head of the port or bay, which extends about 16 miles in a due north and south direction. The centre of the town lies in 11° 20′ 30″ S. lat., and 132° 9′ long. E. of Greenwich. Var. 2° 0′ E. in 1839.]

II.—On the Longitude of Valparaiso and Callao, in a Letter from Baron ALEXANDER VON HUMBOLDT.

Sans Souci, near Potsdam, Sept. 6, 1839.

SIR,—I have long delayed to express the homage of my lively gratitude for your kindness in enabling me so soon to profit by the important observations which enrich the Second Part of Volume IX. of the London Geographical Journal. A journey with the King of Prussia into Bohemia has delayed the renewed expression of my high esteem, and of the always increasing interest caused by reading a journal so rich in original material and so carefully edited.

The too flattering manner in which the President of the Society, Mr. W. Hamilton, has in his excellent address mentioned my trifling and *antediluvian* astronomical labours in tropical America has imposed upon me the task of examining again, and by comparison with new and good observations, the position of some points to which Captain Fitz Roy, in his admirable work (*Appendix to the Voyages of the Beagle*), has attached especial interest. Among the points which I have determined on the coast of the Pacific Ocean, Callao, the port of Lima, is perhaps the most important of all. It is as much so as Cumana, Porto Rico, and Havanah, are in the West Indies. In the luminous and rigorous statement which Captain Fitz Roy has given of the whole of his chronometric determinations, in which, in the entire circuit of the globe, only 33 seconds of time are to be accounted for, to be divided over a great number of separate meridian distances, Captain Fitz Roy says, "Callao, Sydney, and the Cape of Good Hope (*App.* p. 345), are three remote points which might be selected (for comparison), rather than others, because generally supposed to be well determined; if the *Beagle's* position of Callao be proved incorrect, then must Humboldt's (calculated by Oltmanns) be also incorrect."

It will probably be agreeable to you, sir, to be acquainted with the results of some new researches on this point. My longitude of Callao rests, as you know, on the passage of Mercury of the 9th November, 1802. The interior contact, the surer of the two, gave 5h. 18m. 18s.; the mean of the two contacts 5h. 18m. 16s., reckoning always from the meridian of Paris. M. Oltmanns has compared my observation with others made at Greenwich, Paris, Sieberg, Lilienthal, Berlin, Cette, and Copenhagen (Humboldt, *Rec. d'Obs. Astr.*, vol. ii. p. 421-427). A long series of lunar distances taken in the voyage of Captain Duperrey gives 5h. 18m. 16·3s.; Lartigue finds, by distances and chronometric measurements from Quilca, 5h. 18m. 0·7s. (Givry, *Conn. des Tems,* 1827, p. 258); and Captain Fitz Roy decides upon

5h. 18m. 16s. (*App.*, p. 349), resting upon the longitude of Valparaiso. Now, in the expedition of the *Beagle*, 4h. 56m. 7s. is adopted as the longitude of Valparaiso, and for the difference of longitudes between Valparaiso and Callao, 0h. 22m. 9s. Now, 5h. 18m. 16s. is precisely the longitude which the *two* contacts gave me, and 2 seconds of time less than that by the exterior contact of the passage of Mercury in 1802.

The passage of Mercury over the disk of the sun in 1832 having been observed by M. Scholtz at Lima, and at Breslaw by M. Boguslawski, I requested M. Galle, assistant astronomer at the Royal Observatory at Berlin, to calculate the passage.

M. Galle found, for the longitude of Lima,

h.	m.	s.	
5	17	41·4	by the interior contact,
5	17	48·5	by the exterior contact,

mean, 5h. 17m. 45s. Now, I found Lima to the east of Callao (*Rec. d'Obs. Astr.*, tome ii. p. 428), by chronometer,—

			s.
1802,	Nov.	9	28·6
,,	Dec.	14	31·2
,,	,,	17	27·8
,,	,,	27	27·2
			28·7

whence it results that, by the transit of Mercury in 1832, the longitude of Callao is, according to M. Galle, 5h. 18m. 13·7s., while the passage of 1802 gives 5h. 18m. 18s., and Captain Fitz Roy decides upon 5h. 18m. 16s. The accuracy of the determination of the longitude of Callao seems thus, for the last 30 years, to have been circumscribed within sufficiently narrow limits.

As absolute astronomical observations ought to claim attention in preference to relative and chronometric observations, allow me to dwell for a moment on the position of Valparaiso. The occultation of the star, 644 of the Scorpion, was observed on the 28th of October, 1821, with much accuracy, by Captain Basil Hall. Mr. Foster, an observer and calculator generally very exact, accidentally made a mistake in the calculation of this occultation, which gives, not 4h. 55m. 15s., as Mr. Foster thought, but 4h. 56m. 16·6s., for the fort of San Antonio at Valparaiso. M. Oltmanns, according to Bode (*Astronomische Lehrbuch für* 1829, p. 197), in a memoir already written in September, 1826, pointed out the mistake in the calculation by the comparison of the elements. Now, the occultation of Antares* gives 4h. 56m. 42s.: we have, therefore, by the mean of two occulta-

* This occultation of Antares is also an observation of Captain Basil Hall. The observation is good, but the calculation made of it at first was wrong, as is proved

tions 4h. 56m. 29s. = 74° 7′ 15″; but, as lunar distances and the satellites give 74° and 73° 59′, M. Oltmanns, in a MS. memoir which he communicated to me shortly before his death, assumes as longitude of Fort San Antonio at Valparaiso, 74° 2′ = 4h. 56m. 8s., which only differs a second in time from the result obtained in the memorable expedition under Captains King and Fitz Roy.

Captain Beechey has published (*Naut. Mag.*, April, 1838) an important result obtained by the moon's passage over the meridian. Fourteen days' observations, compared with Cambridge, Paris, Edinburgh, and the Cape of Good Hope, differ only 27 seconds in time, and the whole of these transits gives 4h. 55m. 59·1s.: 120 lunar distances give Captain Beechey 4h. 55m. 53·4s.; mean 4h. 55m. 56·2s., only 12 seconds of time less than the whole of the occultations, satellites, and lunar distances had given to my friend and colleague, Oltmanns. If we take the mean of the first-class observations only, for Callao of the two passages of Mercury over the sun's disk, for Valparaiso of the two occultations calculated by M. Oltmanns, and of the lunar transits of Captain Beechey, we have—

	h.	m.	s.
Callao . . .	5	18	15·8
Valparaiso . .	4	56	12·4 *
Difference of longitude	0	22	3·4

which agrees very well with the four chronometric trials of—

	°	′	″
Malespina . .	5	26	28
Captain B. Hall .	5	31	47
Lartigue . . .	5	30	43
Fitz Roy . . .	5	32	15
	0	22	1·4

Perhaps it would be prudent to exclude the result by Malespina as differing the most.

by the comparison of the elements of calculation given by *Bode, Astr. Jahrb. für*, 1828, p. 182. The result is not 71° 30′ 50·5″, but 71° 51′ 25″ west of Greenwich.

* To remind us how useful it is to submit old observations to rigorous calculations, I will cite the eclipse of the sun of the 11th of March, 1709, observed by Feuillée. This eclipse gave Triesnecker 4h. 56m. 29·4s.; Mechain, 4h. 56m. 33s.; Oltmanns, 4h. 56m. 41s. (Paris). I acknowledge that the longitude which results from the transits by Captain Beechey, generally so worthy of confidence, appeared to me to give a longitude rather too much to the east; for we have now definitively for Valparaiso,—

h.	m.	s.	
4	56	41	Feuillée and Oltmanns.
4	56	7	Fitz Roy.
4	56	29	Occultation of Basil Hall.
4	55	56	Beechey.

Oltmanns preferred 4h. 56m. 8s.

As astronomical tables are gradually corrected, it becomes necessary to revise former calculations.

I found Cumana by an eclipse of the sun 4h. 25m. 51s.

By chronometers	4	26	4
By the satellites	4	26	6
	4	26	0·4

—(*Rec. d'Obs. Astr.*, tome i. p. 86).

On the 7th of November, 1799, I had a good observation of the Imm. II. Satellite, with a very clear sky. This observation, published by Baron von Zach during my journey on the Orinoco, gives, by the tables of Delambre, 4h. 25m. 32s.; a corresponding observation at Marseilles makes Cumana in 4h. 26m. 21s. This observation of the II. Satellite has just been calculated with the excellent tables of Damoiseau, by M. Wolfers, a very exact and practised calculator. It gives 4h. 26m. 3·9s., which, as a single observation, only differs 4 seconds from the general mean. At this moment there are so few persons who occupy themselves perseveringly, and with the accuracy that the present state of science admits of, with astronomical geography, especially for points situated out of Europe, that you will oblige us much if from time to time you would transmit to me observations for occultations, eclipses of the sun, and of moon-culminating stars, as I have the means here of submitting them to a rigorous calculation.

The volume of Mr. Charles Darwin is an admirable supplement to the voyage of the *Beagle:* it is one of the most remarkable works that, in the course of a long life, I have had the pleasure to see published. Mr. Darwin unites to sagacity for detailed observations enlarged views in general physics, I should rather say in natural philosophy,—views which embrace at once geology, the geographical distribution of plants, and the influence of temperature on the organic types of the primitive world.

It is also fortunate that this great expedition to the southern regions of America should have induced your able geographer, Mr. John Arrowsmith, to compile his beautiful map of the whole of the continent of South America.

I offer up the most ardent wishes for the success of the magnetic expedition under Captain James Ross, and for the establishment of the stations which we owe to the munificence of the British government: if it is true that the letter I addressed to H. R. H. the Duke of Sussex and to the Royal Society has contributed to these undertakings so useful to science, I should congratulate myself on having had the courage to plead so excellent a cause. I hope that Captain Ross has on board the necessary apparatus

for observing magnetic dip at sea, as M. Adolph Erman* and myself have done. As a stratum of water of immense thickness covers the surface of the globe, these observations, being less affected by local perturbations, are of great importance even when they may be made with less precision.

We shall also learn if the showers of shooting-stars from the 10th to the 12th of August, and from the 12th to the 13th of November, are visible far towards the South Pole.

During the last six or eight months I have been daily occupied with the directions of the chains of mountains in Central Asia, and with a new edition of the two volumes of *Fragmens de Géologie et de Climatologie Asiatiques,* which I published after my return from Siberia. There still remains much doubt as to the position and names of the lakes which in the plateau of Pamer are the sources of the Oxus; I know nothing more of the discovery of the Sini-gúl and "Lake Victoria" of Lieutenant Wood, except the few lines contained in the 'Bombay Gazette' and the 'Asiatic Journal' for November, 1838.

Has the Geographical Society nothing more precise on the topography of Pamer, than some astronomical observations of Lieutenant Wood, companion of the courageous Sir Alexander Burnes? This lake, at 15,600 feet above the sea, is of the more importance to me, as, thanks to the kindness of M. Stanislas Julien, professor of Chinese literature at the College de France at Paris, I shall publish a very curious notice on the plateau of Pamer, extracted from the unpublished travels of Hiouenthsong, a Buddhist traveller of the 7th century.

ALEXANDER HUMBOLDT.

To Captain Washington, R.N.

P.S.—Mr. Schomburgk continues to explore with the same ardour. I hope that he will reach the Cerro Duida, the forest of *Bertholletia,* and the mission of Esmeralda, where I was almost devoured by mosquitoes. May this excellent young man, my countryman, always enjoy the kindness of your illustrious society!

* M. Erman has described his apparatus in *Schumacher's Astr. Nach.*, 1839, p. 364.

III.—*Some Notes on the Gulfs of Kos and Symi, in Anatolia.* By Lieutenant SAUMAREZ BROCK, R.N. Communicated by Captain BEAUFORT, Hydrographer, Corr. Inst. France.

Malta, 20th March, 1839.

I HAVE at length the satisfaction of forwarding the chart of the gulf of Kos, on the south-western coast of Anatolia, with the surveys of the various harbours contained in it, together with some sketches of the land, from the points most useful to distinguish the approaches to them.

The gulf occupies an extent of nearly 60 miles from east to west, and is very deep, no bottom in the middle of it with 300 fathoms of line, and even in the vicinity of the shore seldom less than from 50 to 70 fathoms. No chart extant gives an idea of its shape or extent, and the isthmus has been, hitherto, laid down apparently by guess. In the summer months the upper part of the gulf is unhealthy, and is abandoned by the inhabitants in order to escape the malaria: this, combined with the absence of fresh water on the coast, rendered our survey a work of some difficulty. I have completed the town and harbour of Budrún on the scale of 9 inches to a mile: I have traced the ancient walls, and fancy I have discovered the site of the mausoleum, which has been so often sought for unsuccessfully, and have got sketches of the *bas reliefs* in the walls of the castle, and have little doubt but that they were brought from that celebrated monument. The shores of the gulf are almost uninhabited, but the numerous remains of both modern and ancient edifices prove that in former times it must have been densely peopled. The description of the isthmus given by Herodotus is true to this day: it is about half a mile broad: a natural ravine, which extends from the gulf of Symi, might, with a little exertion, and by digging through a hill of inconsiderable height, convert the Triopium promontory into an island. The structure of the isthmus appears to be volcanic: it is composed of small vitrified rocks resembling lava, and would, doubtless, much annoy workmen in excavating through it; although moderns, who might undertake the task would find no great difficulty in connecting the two gulfs of Kos and Symi by a canal. I send a drawing of a gate standing amongst the ruins of ancient Keramus, interesting both from its antiquity, its solidity, its complete state of preservation, and the elaborate manner in which it is ornamented. The city has been of moderate size, but contains the remains of temples and porticoes, which seem to have been overthrown by an earthquake, leaving, however, enough to show the wealth and good taste of its former inhabitants: after much search I found some imperfect inscriptions. The door-way and gate at Keramus approach in

form to the Egyptian style of architecture, which frequently occurs in this place, but no others are thus ornamented. The number of sarcophagi found along the shores of the gulf is considerable, more especially at Keramus, where a double line seems to have formed the principal entrance to the city: they are very massive, but have all been opened. Some fluted columns, with Corinthian capitals and well-executed amphoræ and grape-vines, lead me to believe that a temple to Bacchus once existed there: the columns are in excellent preservation, but prostrate and overgrown with trees and shrubs. The city has passed through many hands, and several styles of architecture may be seen. The walls, which are plainly traced, and in some places perfect, are principally Cyclopean, repaired at different periods with Hellenic masonry, and guarded by square towers at unequal intervals: they are carried up to the foot of a range of hills joining the north end of the city. On a small hill at the extreme end of the range there has been a square fort, surrounded by a triple wall, which has probably been the citadel. At Giova, at the head of the gulf, I found some tombs cut in the rock, of which I also enclose a drawing and ground plan.

[Mr. Brock's letter was accompanied by two large charts of the island and gulf of Kos, on the scale of 1½ inch to a mile, showing the sites of the ancient towns, the heights of all the mountains, &c., together with various plans of ruins and several coloured drawings of headlands.]

IV.—*Note on a new Map of Kamchatka.* Extract from a Letter from Professor Adolph Erman.

Berlin, 26th February, 1839.

I have the honour to present to the Geographical Society my map of Kamchatka, the publication of which has been delayed by the care bestowed in superintending its engraving. With respect to the origin of this map, and the circumstances which might create some interest for it, I must refer to the first volume of the scientific part of the narrative of my journey, at pp. 209, 289, 346, and 387, where I have collected together my observations for latitude and longitude for about twenty points of the peninsula, and the barometric measurements of its mountains and elevated table-lands. At p. 346 I have compared the dimensions of the country according to all existing maps with those assigned to it by my own observations. They are at times reduced to two-fifths of the extent falsely assigned to them; and the result was, that this province of the Russian empire might be well considered among the *terræ incognitæ.* I might add, in support of this

remark, that the latest Russian maps had, so to speak, doubled the existence of a whole series of localities, for we saw on them the names of many villages in Kamchatka, situated between the port of St. Peter and Paul, and the sources of the river Kamchatka, noted a second time along the direct line between the said port and the town of Bolcheresk. The truth is, that all these villages twice mentioned really exist only once, and that they were not aware at St. Petersburg that steep mountains prevented travellers from passing direct from St. Peter and Paul to Bolcheresk, but, on the contrary, obliged them to go first towards the N., by the same road which leads to the sources of the Kamchatka, and not to turn to the south-west till they had reached a large ravine which opens in a transverse direction through the mass of mountains which bound the course of the river Avatcha.

I have thought it right to dwell upon these corrections in the delineation of the form of the country and its conformation, because they alone can offer a solid basis to the comparative combinations of geology, and authorise our theories upon the volcanic character of the peninsula, as well as upon the origin of its mountains, its lakes, its eruptions of thermal waters and vapours. I shall soon publish a circumstantial account of my visit to Kamchatka, which will supply all that must be deficient in a map on the points I have alluded to; and I now content myself with some preliminary observations upon the general character of the geological phenomena of this country, which, from its position upon the natural limits of the old continent, seems to deserve particular attention.

Though the volcanoes lying along the eastern coast of Kamchatka are upon two great regular circles or geodosic lines, we find mountains of two kinds mixed, and almost in contact, in each of the two series, the characters of which are quite distinct, and indicate an essentially different origin. I shall endeavour to illustrate this fact by a single example, in directing your attention to the two mountains called Shiveluch, lat. 56° 40′, and the Pic de Kliuchevsk, lat. 56° 20′: the latter presents a large base swelling in an elliptic curve, and crowned by four cones, one of which is as high as Mont Blanc. I have seen this in picturesque and sublime activity, and approached the burning lava, which poured forth a continuous stream, till I reached the height of 8000 feet above the sea. But in this ascent, and during several days that I was exploring the valley and deep ravines that furrow the circumference of the cones and the base of this immense volcano, I sought in vain to find some very compact rocks (if I may say so), formed by a single jet, and that one have might likened to the structure of a granitic mountain or any other primitive rock, and consequently looked upon as belonging to a

sort of crystallized skeleton, into which the streams and fragments of lava had only passed as by a previously-confined vent. On the contrary, though the sides of this Pic present in many places walls 100 feet high, these masses are always blistered and impressed with the character of ordinary streams of lava, still hot, and which have only just had time to set. The one and the other consist of an augitic, amorphous, and strongly-blistered mass, with large crystals of Labrador felspar.

Compare with this volcanic group the mountain Shiveluch, which is only a few miles from it on the N., and which, in spite of a considerable chemical conformity between its masses and the lavas of the Pic de Kliuchevsk, differs altogether in its outline and in the texture of the component rocks. The sketch I have added to my map will at once show it has not the least resemblance to an inflated ball, or to a cone of piled fragments. Shiveluch, on the contrary, presents the aspect of a principal crater and several subordinate ones, in the form of tables or plains, each of which is comprised between two parallel* vertical sides, terminated at the top by an inclined plane. These upper surfaces terminate at the culminating point of the mountain, about 10,000 feet above the sea, where all these immense prisms unite and are lost. I allow that at first sight the form of this outline made me look upon Shiveluch as a mass forced from beneath the surface at a single eruption, in a state very near consolidation, and through apertures that previous pressure had opened in the shape of a star; but what still further strengthened this hypothesis is, that the parts of this mountain consist of a perfectly crystalline rock, composed of *albite* and *amphibole*, which, though evidently pyroxene, resemble flowing lava as little as the granitic rocks of the Alps, or any others that we call primitive. The result of several similar examinations was to convince me that the volcanoes on the E. of Kamchatka owe their origin to two entirely distinct causes. Some of these mountains, such as Shiveluch, and those like it, appear to me formed at a period when the hardened crust that covered the melted nucleus of our planet had still so little thickness that it cracked by the molecular expansion of those beds that were in process of crystallization beneath. Of this number must have been (both in Kamchatka and in America, where it forms the summits of several of the Cordilleras) the rocks composed of albite and amphibole, which at that time forced itself in masses through the crevices it opened

* I must observe that the foot of these vertical sides is surrounded and concealed to a considerable height by fragments which atmospheric agency has detached and crumbled from their own mass. The same agents cause avalanches of stone, which we heard fall with the noise of thunder continually, during several days we passed on the Shiveluch and the plains beneath.

for itself—as we see ice, when formed beneath a solid body, split it, inject itself, and pass through it in the form of prisms, by the repulsive tendency of its molecules at the moment of freezing alone. Such a formation, if not unheard of, is become very rare now,—probably because, through the constant escape of central heat in the earth, the consolidated bed has already acquired such thickness, that the masses setting beneath cannot penetrate it entirely by the power of their molecular expansion. All that we now see of volcanic action, either in the volcanoes of Kamchatka or those of other countries, is very evidently owing to the co-operation of steam, the elasticity of which corresponds to the temperature of the fusion of lavas, or, at 800° of Réaumur, raises and expels by former passages streams of mineral bodies, whose density is much lessened, and consequently their passage facilitated by innumerable bubbles of gas and vapours with which they are impregnated. As to the body of mountains which occupy the longitudinal diameter of the peninsula, I found them bristled with a number of volcanic lavas which rise up and appear set in rocks more or less evidently pyrogenic. I have drawn upon the margin of my map one of the streams of augitic lava that I observed in this central chain of Kamchatka (Volcan des Baidares). The conical heaps of scoriæ and volcanic cinders, as well as the furrows and "moraines" which the lava-torrents have excavated before them, still look so fresh, that they continually tempt us to consider them the result of a recent eruption; and yet the natives declare that no change in the mountains has occurred from time immemorial. The western side of Kamchatka is composed of neptunian, secondary, and tertiary rocks. I observed the chalk formation and lignites very rich in yellow amber, covered with ferruginous sandstone. This disposition has doubly interested me, since I compared it with the famous amber-formation on the shores of the Baltic, near Königsberg. It is really curious to find at so great a distance (as between the Baltic and the sea of Okotsk) contemporary beds whose mineralogical characters so minutely resemble each other.

I have collected a good number of fossil shells from these two formations, and propose shortly giving you the result of my comparison of the two.

ADOLPH ERMAN.





V.—*Outline of a Route through the Panj-áb, Kábul, Kashmír, and into Little Tibet, in the Years* 1834-8. By G. T. Vigne, Esq

Having just returned to England, after an absence of seven years, about five of which were passed in countries at this moment of peculiar interest to every Englishman, I am induced to believe that a brief outline of my travels, while the more detailed account is preparing for publication, may not be unacceptable to the members of the Geographical Society.

Quitting England in October, 1832, I passed through Constantinople, Trebizond, and Kurdistan, to Persia, where I resided during the summer months with Sir John Campbell, then British Envoy at the court of Tehran; from whence the principal excursion that I made was into Mazanderan. I thence descended by the usual route to Bushire, and soon afterwards arrived at Bombay.

An impaired state of health, an anxious desire for breathing cold air, and the prospect of enjoyment among the magnificent scenery of the Himálaya, combined to send me to the north of India, which I had not the least intention of visiting when I left England. After travelling a little in the mountains between Simlah and Misúrí, I descended into the plains to visit the Taj, at Agrah, whence, having at last, after a great deal of delay, obtained leave to cross the Setlej and proceed to Kashmír, I started direct for Ludh'yánah. I crossed the river at Belas-púr, below the fortress of Maláún, and, attended by a servant of the Mahá Rájah Ranjít Sing'h, to whose kind treatment of me I am happy to bear testimony, proceeded along the skirts of the lower mountains to Jambú and Rajawar, where I joined the great road of the Moguls, and entered Kashmír at Shapiyán. Altogether I have had the good fortune to reside a much longer time than any other European in this celebrated valley; have passed through it three times in my visits to Tibet, and may say generally that I have seen all that is to be seen there, or with very little exception, having traversed the greater part of it several times. I am in possession of a large map of Kashmír, on the scale of 2 miles to an inch, connected with the Indus on the north; and showing many of the passes which I traversed two or three times: I have also several observed latitudes. My map is chiefly laid down from a base of 3 miles, measured on a plain in the centre of the valley, by Lieut. Mackeson, political assistant to Col. Wade, aided by Dr. Falconer, Superintendent of the E. I. Company's Botanical Garden at Saháran-púr. Lieut. Mackeson entered Kashmír for a little time, but was shortly recalled to his more important duties, as assistant political agent at Pesháwar. Having received a most cordial invitation from Ahmed Sháh, the king, or "Ergilfo," of Little Tibet, I pushed over the passes from the Wulur lake; met him close to the elevated plain of Deosoh, or Deosaïh; was conducted to his

capital by him, and treated with the greatest kindness and respect, as having been the first Englishman who had paid him a visit. So fine a field induced me to pay him a second and a third. I made an attempt to reach the Nubrá Tsoh, whence flows the great northern branch of the Indus, but was (although I entered the valley of Nubrá) foiled by the treatment I experienced from the insolent servants of Guláb Singh, of Jambú, one of the rajahs, who, having been raised from the rank of common soldiers by Ranjít, have eventually become too powerful for their master, and prevented my moving forward, in the teeth of the positive orders of the Mahá Rajah, given in full derbar. It is unnecessary to mention here to what causes I attribute the treatment I received; but the more I see and hear, since my return, of the great anxiety for information about those countries, the more annoying is the reflection on what I might have done, had I been fairly assisted only to the extent that I ought and sought to have been, as a private English traveller.

A second attempt about this time last year to reach the source and the frontiers of Yar-kand, by another path, failed in consequence of the new snow falling upon the passes three weeks earlier than the usual time. I returned to India through Kashmír and the mountain states and towns on the N. of the Panj-áb, some of which, such as Chambak, Badrawar, Dodah, &c., have never been, I believe, previously visited by any European traveller. I have also, to the best of my ability, mapped the whole of the last-mentioned country, and connected it with Ludh'yánah: so that the map I have made is that of the whole of Alpine India on the N. of the Panj-áb, including Kashmír, Great and Little Tibet, the course of the Indus, more or less correctly, from Ladák'h to the plain of Peshawar, and the whole of the hill country between Kashmír and Ludh'yánah. The fosse and ruins on the Sikander-ke-D'har, or Hill of Alexander, mentioned by Mr. Moorcroft, I seriously believe to be the remains of the altars of Alexander. The Rajah of Mandeh assured me that, although the place has frequently been used as a fort, yet that the ditch and ruins, &c., had always existed there from time immemorial. I found there on a stone an ornament which might have passed for a roughly-carved Grecian rosette, which I copied.

I went to Ghazní with the Lohani caravan, along the course of the Gomal river. Kandahar I did not visit, as there was then nothing of particular interest about it. From Ghazní I proceeded to Kábul by a bye-road, seeing the famous dam built by Mahmúd, and called the Bandi-Sultán. I remained at Kábul three or four months, and received every civility from Dost Mohammed Khán, and his brother, the Nawwáb Jabbar Khán, whose guest I was. I made several excursions in the neighbourhood of Kábul, but did not cross the Hindú Kush, the requisite permission from Murád Beg, of Kundúz, not having been ob-

tained, chiefly because the present for him, which I ordered from Calcutta, was unfortunately not forwarded from Ludh'yanah till two months after it should have been.

Upon my arrival at Ludh'yanah, last March, I immediately descended the Indus to Bombay, in company with General Churchill, who kindly allowed me to take advantage of the preparations which had been made for him. I reached Europe by the overland route through Egypt.

I should not forget to mention that I have had the good fortune to bring home safely a great number of sketches, portraits, &c., and an interesting collection of miscellanea, and two accurate panoramic views—one of the vale of Kashmír, and the other of the city of Kábul.

Having thus given a general outline of my travels, I proceed to give an answer to some queries about the Dardú country. The valley of Kashmír lies about N.N.W. and S.S.E.: if its greater axis were continued, it would (as well as I can judge before marking it on the map), cut right through the Dardú country: the snowy ranges seen in my panoramic view of Kashmír are, I believe, those which rise between the Indus and the Krishn Gangá, the Dardú country lying at their feet on the left or eastern bank of the Indus. Its latitude, that is, the latitude of its centre, may be about 20 or 25 miles below the junction of the Astor, or Hasorah river, with the Indus, which will make it about 34° 48′, probably. I have seen it from a mountain immediately overhanging the junction of the Astor river with the Indus, and whence, in fact, I traced with great ease the whole course of the Indus, nearly down to the plains. The stream itself is visible for not less than 50 or 60 miles. Astor is, strictly speaking, in the Dardú country; but, as Astor belongs to Ahmed Shah, it is always specified by its name when speaking of it. The country of Dardú proper, when spoken of, consists of three or four of the numerous wild states that border on the Indus from Astor downwards. I have the names and positions of all of them but Chilas (in particular, I believe), with Tori, Jelkót, Palas, and Koli form the Malki-Dardú. As to their towns, I am not aware they have any; I should think nothing but small villages: they are a wild and lawless set, and, whilst a portion are employed in agricultural pursuits, the others are known and feared as marauders. The thieves whom Ahmed Sháh of Iskardó cut up immediately before I met him, just below the plains of Deosóh, were plunderers from Palas, who had penetrated through the mountains, and were carrying off men, women, children, and a large number of cattle, from one of his villages. They own no authority but that of their múllahs, are quite independent of each other, and are Sunní Mohammedans. Ahmed Sháh assured me that they wear a large ring of iron on the

wrists, round which the fingers are doubled, and then used in general battles in the same manner that the ancients used the cestus. The Dardú country lies to the south of the great Himálaya chain.

The direction and distance of Iskardó from the Wulur lake is about N.E. 60 miles. The direction of Iskardó from Drás itself will be northerly: it is about a fortnight's march from it, the Sind'h pass being much longer than that by Bander-púr and Garás, which occupies but 11 days. Iskardó itself, like the other valleys in Tibet, is an open sandy flat, 18 miles long, by actual survey, surrounded by enormous mountains and washed by the Indus. The rock, or kal'ah, is about 800 feet high, and was once evidently washed on both sides by the Indus, but now only on the western and northern. I have once thought it was the Rock of Aornos, but it is too far in the mountains, and too barren of trees to warrant belief of it. Kamlah G'har in the Mandeh country, washed by the deep Biyas, answers the description of Aornos better than any place I know (singularly so, I may say); but it is on the wrong side of the Indus. Tárá-g'har (that is, Satárá G'har, or the Star's house*), near Nar-púr, in the Panjab, is another such fort. Daïr will, I think, be found to be Aornos, if we are to believe it to be on the west of the Attak. It is a strong mountain fort, round which runs a river of the same name, which joins the Kábul river at the Hasht-nagar, on the plain of Peshâwar.†

As before mentioned, my map is upon the scale of 2 miles to an inch; the base, I repeat, was measured with great care by Lieutenant Mackeson, with the help of Dr. Falconer: I was present during part of the time, and when it was finished, and I can vouch for its accuracy. I had often measured smaller bases in different parts of the valley, but have made my map of Kashmír chiefly from this. It was measured on the Kariwah, or plain of Dámodar-udar, the same near or upon which the great serpent resided, which frequented the waters when the valley was a lake. The direction of the base was N. 37° W., its length about 3 miles.

I obtained four small vocabularies of different languages, Kashmírian, Little Tibetian (which differs considerably from the Ladákhí), Chitrálí, and the Dangrí or Ghilghítí, which, I am told, much resembles the Hindustaní.

The mountains of Little Tibet are usually of much the same elevation, from 15,000 to 16,000 feet; but from any open summit, such as that at the junction of the Astor valley with the Indus, whence there is one of the finest views in the world, several mountains are seen in different parts that rise far above them, such as would make Mont Blanc look small beside them. The Harámósh (all sides)

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* Rather Gar'h, fort.

† I am indebted to Prof. H. H. Wilson for the derivation of the word Aornos from Awar, "a stockaded place," as Peshâwar, Kajáwar, &c.; and near Kamlah G'har is an eminence called Awar Deví, or goddess of the fortress.

mountain, in the valley of the same name on the Indus, the Múz-ták range, which is seen in the distance, and the stupendous peak of the Nangá Parbet (the naked mountain), or Diyarmal, as it is called by the Little Tibetians, between Astor and the Dardú country, are of this description. I have seen the same magnificent view from the summit of the passes between Ladákh and Nubra, whence the Múz-ták presents a most noble appearance. There is a pass from Little Tibet towards the Múz-ták, up which Dr. Falconer ascended for several days farther than I have been, and poor Dr. Henderson visited Nubrá before I did, and arrived at about the same distance. He was obliged to travel as a Sayyid, and the fatigues and privations that he underwent were too much for him, and he died in my presence at Ludh'yánah. The public are great losers by his death.

There are two Káshghars; Chitrál is called Little Kashghar by the Yarkandís. At present, I think that the Hindu Kush may be said to be joined to the Himálaya of Tibet by the Laurch pass between Chitrál and the valley of the Daïr, that which joins the Kábul river at Hasht-nagar on the plain of Peshávar.

There are two passes into Tibet, the Bander-púr and Gurás pass, by which I have gone three times and returned once, and the Darí's pass, by which I have twice returned to Kashmír: it is not so difficult, although longer. After ascending the pass from Bander-púr to a height equal to that of the Pír Panjál pass, about 12,000 feet, I walked along a broad ridge until I saw the valley of Gurás lying at my feet like a punch-bowl, with Krishn Gangá running along it. This river is formed of two branches, one from the valley of Tilaïl, somewhat like that of Gurás (to which, however, I have not been), and the other from Deósóh: they join at the entrance of Gurás. I followed up the river for three days to the plains of Deósóh: I then, either as in the first instance, ascended to and crossed these plains to Iskárdó, or, after crossing a lofty snowy pass and a frontier torrent, a place of great natural strength, where Ahmed Sháh beat off the Sik'hs, descended a rocky valley the whole way to the western end of the valley of Iskárdó. At the further extremity of Déósóh, there is an ascent of 400 or 500 feet over a snowy ridge, and thence the rocky vista conducts the eye at once upon the plains of Iskárdó and the mountains beyond it. Iskárdó is the name of the valley; there is no city. Dó* signifies an open space where two rivers or two ways meet. As to the population of the valley, it may be counted by the villages at an average (a rough guess) of 250 persons in each throughout Tibet. Ahmed Sháh and his people have always insisted that he can produce 12,000 men armed in some way or another. I think he might be able to muster about 7000 or 8000.

* Dó is "two" in the Persian and cognate tongues.—F. S.

VI.—*Discoveries in the Antarctic Ocean, in February*, 1839. Extracted from the Journal of the schooner Eliza Scott, commanded by Mr. JOHN BALLENY, communicated by CHARLES ENDERBY, Esq.

THOSE who take an interest in Antarctic discovery will remember that in the years 1831-2 Mr. John Biscoe, R.N., in command of the *Tula*, a brig belonging to the Messrs. Enderby of London, discovered two portions of land, about 110° of longitude apart, in the parallel of the Antarctic Circle, which were respectively named Graham Land and Enderby Land. In the following year Mr. Biscoe was again despatched by these spirited owners, but the vessel was wrecked. Nothing discouraged by this failure, and by the heavy loss already incurred, Messrs. Enderby, in conjunction with some other merchants, determined on another South Sea sealing voyage, giving special instructions to the commander of the expedition that he was to lose no opportunity of pushing as far as he could to the south, in hopes of discovering land in a high southern latitude.

The schooner *Eliza Scott*, of 154 tons, commanded by Mr. John Balleny, and the dandy-rigged cutter *Sabrina*, of 54 tons, Mr. H. Freeman, master, the vessels selected for this purpose, having three chronometers on board, and well equipped with whatever appeared requisite or desirable on such an enterprise, sailed from the port of London on the 16th July, 1838.

Sighting the island of Madeira, the two vessels crossed the equator in 22° 40′ W. longitude, touched at the island of Amsterdam,* and on the 3rd December anchored in Chalky Bay, near the south-western angle of the southern island of New Zealand, or, as named by the natives, Tawaï Poënamnú.

During the whole month of December, the midsummer of these latitudes, the weather here was very stormy, with heavy rain, but the vessels laid secure in Port Chalky, or Port South, an excellent harbour, rather more than 3 miles long by 1 broad, on the south-eastern side of Chalky Bay, and were fully occupied in refitting, watering, &c., and making every preparation for their sealing voyage to the Frozen Ocean. In speaking of Chalky Bay, Capt. Balleny says:—

"When about 5 or 6 miles to the westward of Cape West, one sees

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* Amsterdam Island has been confounded in most English charts with the island of St. Paul, which lies nearly in the same meridian, but about 60 miles farther South. These islands, it is believed, were discovered by Vlaming in 1696; and from the account of his voyage given in Valentyn's *Oud en Nieuw Oost Indien*, vol. iv. p. 69, we learn that in November and December of that year the Dutch navigator visited and landed on both the islands, applying the name of Amsterdam to the more northern. In October, 1837, Captain Wickham, in Her Majesty's ship *Beagle*, determined the position of the northern island to be in lat. 37° 52′, South long. 77° 36′ E., Var. 21° W.; elevation 2760 feet: this position is within 4 miles of the latitude of Amsterdam Island, as given by Vlaming and D'Entrecasteaux.—ED.

the white cliffs of Chalky Island lying near the middle of the entrance: yet the cliffs are not of chalk, as might be supposed from the name, but of hard white rock. In running down to the S.S.E. from Cape West you see the Table Rock (always from 10 to 12 feet above water) broad on the starboard bow. Now, by the plan of Chalky Bay,* given to me before my departure from England by Capt. Washington, Secretary to the Geographical Society, when two miles off Cape West the Table Rock appears shut in with the south point of Chalky Island, whereas it should be placed more than a mile farther west, or bearing S.S.W., and not S.E., of the south point of the island. South-easterly from the Table Rock extends a very dangerous reef, on which the sea in bad weather breaks furiously, and at the southern extremity is a rock always above water: this reef, about a mile long, extends directly across the entrance of Chalky Bay, so that all ships ought to make Cape West.

"There is no hidden danger in beating up the bay, but the soundings laid down are all imaginary: there are no soundings till within a few yards of the rocks. I worked up the bay with the deep-sea lead going all the way, and I never yet struck the bottom. Only twice the schooner's length from the rocks, abreast of the cascade in Deep Bay or Cunaris Arm, we had an up and down cast with 80 fathoms and no bottom, yet it is marked on the chart 10 and 7. The entrance into Port North is narrow but deep, and at the top shoals, till there is scarce water for a boat. Edwardson's Arm forms a splendid harbour. Port Chalky or Port South, on the south side of Chalky Bay, is the harbour generally used by ships visiting this part of New Zealand. In the entrance, and nearly in the middle, but rather nearer Garden Island, is a rock just visible at high water. Looking up Port Chalky, the first bight or bend of the land on the left is called Ship Cove, and off the point, where 10 fathoms are marked, a reef runs up the harbour nearly one-third across the cove. The *Eliza Scott's* anchor was let go in 8 fathoms, and when she swung she struck on the reef: about three times the ship's length from the reef we had 22 fathoms. In mid-channel are marked 8, 7, 6, and 3 fathoms. Now the fact is, that in mid-channel are 35, 25, 22, 18, 15, and a short cable's length from the beach 8 and 9 fathoms. The cutter *Sabrina* at one time rode close to the beach at the top of the harbour, and had 3 fathoms under the stern. The ground is good. The passage between Garden Island and the main is merely a boat-passage, and full of rocks. There is not the vestige of a hut in Port Chalky. Preservation Bay, to the southward, is a picturesque spot, full of islands and covered with wood: the beauty of the scenery can hardly be described, but anchoring places are difficult to find, the water is so deep. The soil is good; most garden-roots and seeds grow well, and rye-grass admirably. The plan of Chalky Bay and harbour are good, with the exceptions already mentioned: there are no inhabitants on this part of the island: the ground being covered with wood produces myriads of flies of a very poisonous description;

* A copy of the plan given in Admiral Duperrey's Atlas of the Voyage of the *Coquille*, compiled by the lamented M. de Blosseville from information obtained at Sydney from Captain Edwardson and the commanders of some English merchant ships. See also the *Annales des Voyages*, vol. xxix.—ED.

the bite of a musquito is not to be compared to it for severity and effect. it is a small black fly with a deep blue tinge. I saw no wild animals except rats. The tide here rises about 6 feet, and it is high water at full and change at 11 o'clock."

Jan. 7, 1839.—Sailed for the southward; on the 11th anchored in Perseverance Harbour, Campbell Island, where, by a curious coincidence, they met with Mr. John Biscoe, R.N., in command of the *Emma,* on a sealing voyage. On the 17th again made sail to the south-eastward: on the 19th, in lat. 54°, with the weather calm and fine, the Aurora Australis was very brilliant. On the 23rd, in lat. 59° 16′, long. 173° 20′ E. of Greenwich, the indications of the vicinity of land, as large quantities of seaweed, divers, mutton-birds, &c., were so strong, that the weather being very thick, the vessels were hove to. On the following day they passed the branch of a tree, but as it cleared neither land nor ice were in sight, and they continued standing to the S.S.E. till the 27th, when in lat. 63° 37′, long. 176° 50′ E., they crossed Capt. Bellingshausen's route of the Russian corvette the *Vostok*, in December, 1820, and here saw their first iceberg. Continuing to the southward over the very spot where compact ice had forced the Russian navigator to alter his course to the eastward, the vessels, on the 28th, reached their extreme eastern longitude, namely, 178° 13′ E.; and on the following evening, in the parallel of 66° 40′, and long. 177° 50′, the variation observed by azimuth was 28° E. At this time field-ice bounded their southern horizon, and numerous large icebergs were in sight. At sunset on the 30th, in lat. 67° and long. 176°, the variation observed by amplitude was found to be 33° 25′ E. They were now surrounded by icebergs and small drift ice: the wind during the last week had been constantly from the westward, varying from N.W. to S.W.

At noon on the 1st February the sun broke out and the weather cleared—lat. by observation 68° 45′. At this time no ice was in sight from the mast-head; and they stood to the southward with a fresh breeze till 3 P.M., when they found themselves near the edge of a large body of packed ice, and were obliged to tack to the northward to avoid it. This, then, was their extreme south point, as they had now reached the parallel of 69° in long. 172° 11′ E., full 220 miles to the southward of the point which Bellingshausen had been able to attain about this meridian: thus adding one proof more, that ice in these regions, even in the immediate neighbourhood of land, is very far from stationary.

Feb. 2.—Still embayed in field-ice: the var. this afternoon in lat. 68°, long. 171° 30′, was found to have increased to 36° E. On the 5th observed the water to be much discoloured, and many feathers floating. Saw several whales, sea-leopards, and pen-

guins. Gradually working to the N.W. to clear the ice, against a strong westerly wind, which, contrary to the received opinion, was found to prevail in these high latitudes.

Feb. 6*th.*—This morning commences with light winds and thick weather. At noon more clear: heard the surf to leeward. About half-past 12 it cleared a little, when we found we were in a deep bay, formed by what evidently appeared to be barrier ice and close to it. As we proceed west, the ice appears to lie more to the northward. Tacked ship to N.N.W.; very little wind from west, and thick fog. The water had been very dirty all day, with a great many feathers. Lat. noon by acc. 67° 37′, long. by acc. 164° 54′: wind west: therm. 37°.

Feb. 7*th.*—Begins and continues to the end, light winds and very thick with dirty green-looking water. At noon lat. 67° 7′, long. 165° 5′: wind west: therm. 38°.

Feb. 8*th.*—This morning light winds and thick weather. At 2h. A.M. heard the roar of surf. At 3h. passed a large berg of ice close to us. Saw a young seal. No observations this day. At noon lat. by acc. 66° 44′, long. by acc. 165° 4′: wind N.E.: therm. 41°.

Feb. 9*th.*—This morning thick fog. Passed a great many icebergs and saw a great many penguins. At 8h. clear, steering west by compass, got sights for my chronometers, which gave the ship by the Port Chalky rate in long. 164° 29′ E.*

At 11 A.M. noticed a darkish appearance to the S.W.: observed the lat. to be 66° 37′ S. by mer. alt.: wind north. At noon the sun shone brightly: saw the appearance of land to the S.W. extending from west to about south—ran for it: at 4h. made it out distinctly to be land. At 8h. P.M. (having run S.W. 22 m.) got within 5 miles of it, when we saw another piece of land of great height, bearing W. by S. At sunset we distinctly made them out to be three separate islands of good size, but the western one the longest. Lay-to all night off the middle island.

Feb. 10*th.*—At 2h. A.M. bore up for it, ran through a considerable quantity of drift ice and got within half a mile, but found it completely ice bound, with high perpendicular cliffs. I wished to run between the middle and western island, but was compelled to come out to the eastward again, as, from the western island to the eastern one on the west (or rather S.W.) side, the sea was in one firm and solid mass, without a passage. The weather at sunrise was very threatening. At 6h. it came on thick, since when we have been compelled to stand off. I make the high bluff western points of the middle island to be in lat. 66° 44′ S., long. 163° 11′ E. A lunar at 2 o'clock agrees with the Port Chalky time. Temp. at noon 42°: wind east, the weather continuing moderate, but very thick, to the end.

Feb. 11*th.*—Thick. At 1 o'clock A.M. had to hoist out a boat to tow the vessel clear of an iceberg which we were close to, but could not see, and no wind. At 11 A.M. cleared, and saw the land bearing about W.S.W. and of a tremendous height, I should suppose at least 12,000 feet, and covered with snow. At noon we had a very indifferent obser-

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* The rate obtained at Port Chalky is used throughout: the London rate would give 1° 40′ 0″. or 40 miles distance in this latitude farther east.—Ed.

vation, which gave the lat. 66° 30′, and it immediately came on thick: wind N.W.: temp. 42°.

Feb. 12*th.*—This morning the weather clears and thickens occasionally. At 2h. A.M. saw the land bearing S.S.E. about 10 miles. The west point of the west island bore W.N.W. At 8h. land completely ice-bound. At noon temp. 35°; tacked and worked in shore for harbour or beach. At 4h. P.M. abreast of the small island: the eastern island now at a different bearing appeared a large one: lat. by acc. 66° 22′, long. 163° 49′ E. At 6 P.M. went on shore in the cutter's boat at the only place likely to afford a landing; but when we got close with the boat it proved only the drawback of the sea, leaving a beach of 3 or 4 feet at most. Capt. Freeman jumped out and got a few stones, but was up to the middle in water. There is no landing or beach on this land; in fact, but for the bare rocks where the icebergs had broken from, we should scarce have known it for land at first, but, as we stood in for it, we plainly perceived smoke arising from the mountain-tops. It is evidently volcanic, as the specimens of stone, or rather cinders, will prove. The cliffs are perpendicular, and what in all probability would have been valleys and beaches are occupied by solid blocks of ice. I could not see a beach or harbour, or anything like one. Returned on board at 7h. and got the vessels safely through the drift ice before dark, and ran along the land.

Feb. 13.—Light winds from the southward and cloudy weather, with much ice around. At 8h. 30m., a fog coming on, took the bearings of the centre of the land S.S.W., distant 16 leagues by the log. Numerous whales and penguins in sight, also a few Cape pigeons and a small white bird, but no albatrosses nor mollymawks. Tried for soundings several times, at the distance of 6, 8, and 10 miles from the land, but got no bottom. At noon, lat. by account 65° 45′, long. 164° 51′, wind S., therm. 37°. Altered the course to N.W.

P.M. Thick fog—saw many whales and seals, and both icebergs and drift-ice. At midnight, light variable winds and cloudy dark weather.

This was the last time that the land, now appropriately named the Balleny Isles, was seen. The group consists of five islands, three large and two small, the highest of which, named Young* Island, was estimated by Captain Balleny, as well as by his mates, at 12,000 feet above the sea. It rises in a beautiful peak, which may be called Peak Freeman, as being on the island on which the commander of the cutter *Sabrina* landed.

When at the distance of from 8 to 10 miles from the centre island, with the extremes of the land bearing from W. round southerly to E. by S., the accompanying sketch was made by Mr. John M'Nab, 2nd mate of the schooner: the outline of the

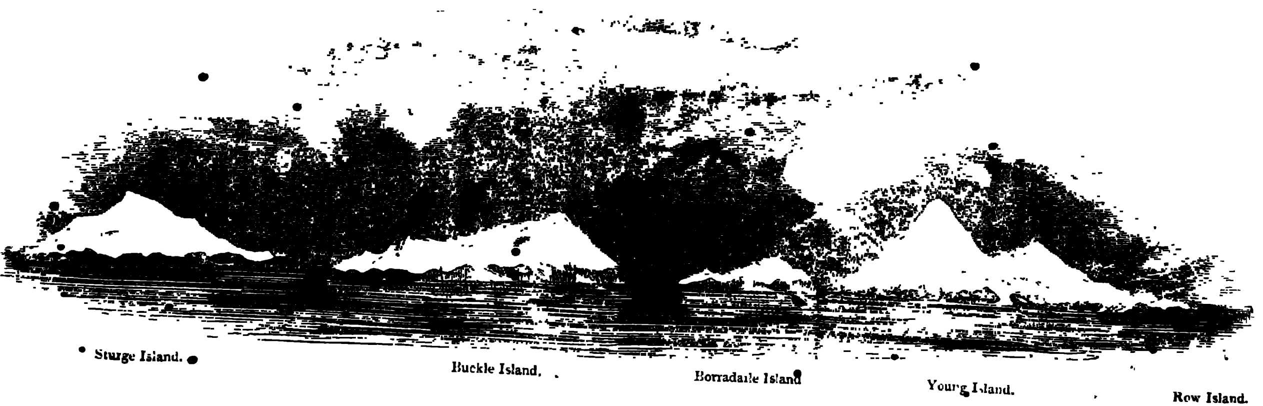
* These islands and peaks are named respectively after Messrs. G. F. Young, W. Borradaile, J. W. Buckle, T. Sturge, W. Brown, J. Row, and W. Beale, th spirited merchants who united with Mr. Enderby in sending out this expedition.

islands is evidently volcanic, and the smoke which arose from the second island to the E., or Buckle Island, and the stones brought away from Young Island by Mr. Freeman, which prove to be scoriæ and basalt, with crystals of olivine, leave no doubt on the subject. These then are, with the exception of that discovered by Bellingshausen in 69° S., the most southerly volcanoes known. The easternmost, or Sturge Island, rises also to a peak, named Brown's Peak, but is not half the height of the former. Immediately off the eastern end of the centre, or Borradaile Island, is a remarkable pinnacle of rock, called Beale Pinnacle, which is described as rising like a tall lighthouse from the waters. The westernmost, or Row Island, is low, and offers no remarkable feature.

Feb. 14.—Continued working to the N.N.W. against a fresh northerly breeze, which on the following day fell light and variable.

On the 16th it freshened up from the N.N.E., and at noon this day they had reached as far N. as 63° 15′, and were only about 50 miles distant to the southward of the track of Bellingshausen, in 1820, when he first crossed that parallel. We may here notice also that the group of Balleny isles lie only 145 miles distant, in a S.W. direction from the point at which the Russian navigators crossed the parallel of 65°, and that, if the weather was very clear (an improbable case in these latitudes), the lofty peak of Young's Island might possibly have been visible on the utmost verge of the south-western horizon from the masthead of the *Vostok*.

Taking advantage of a fine breeze and a clear sea, the vessels now ran rapidly for 170 miles to the S.W., till the weather becoming foggy obliged them to heave-to till the morning of the 18th, when it cleared up, and, finding no ice in sight, they again stood to the southward: lat. at noon, 64° 32′. Captain Balleny remarks that he had observed a clear sea generally between the barriers of ice, and about 2° to the S. of it. After a day's variable wind, with snow and sleet, the breeze gradually freshened from the E. into a fresh gale, which carried them rapidly to the westward: numerous flocks of mutton-birds, and about thirty whales, were seen, but only one iceberg. On the 22nd, at noon, the latitude observed was 63° 30′, long. 141° 13′, therm. 38°, temp. of water 34°. In the afternoon an azimuth, with the ship's head W., gave the variation 17° 52′ E. The two following days continued to the westward against a westerly wind, which on the 25th freshened from the E. with snow and sleet; saw immense flocks of birds flying from the N.E. to the S.S.W., many whales and porpoises, and a few icebergs. On the 27th, at noon, the obs. lat. was 64° 37′, long. 130° 32′ E., therm. 35°, temp. of



THE BALLENY ISLANDS.

Discovered 9th February, 1839. West Bluff of Centre Island in lat. 66° 44′ S., long. 163° 11′ E. Land bearing from West to East by South.

water 34°. An amplitude at sunset, with the ship's head N.W., gave the variation 14° 54′ W.: thus, in the difference of 11 degrees of longitude, or a distance of about 250 miles in this parallel, the variation had changed 32° 45′, or nearly 3 points.

"*March 1st.*—With a steady breeze from the S.E. continued standing to the westward—passed several icebergs, and numerous flocks of penguins, petrels, and mutton-birds.

"*March 2nd*, A.M.—Squally from the S.E., with snow and sleet. At 8 cleared off a little. At noon, lat. obs. 64° 58′, long. 121° 8′, therm. 35°. P.M., Strong winds, and showers of snow and sleet; saw a great many birds. At 8, the water becoming smooth all at once, shortened sail, and hove-to. Saw land to the southward, the vessel surrounded by drift ice. At midnight strong breezes with snow.

"*March 3rd*, A.M.—Found the ice closing and becoming more compact; stood through the drift ice to the southward. At 8h. found ourselves surrounded by icebergs of immense size; to the S.W. the ice was quite fast, with every appearance of land at the back of it, but, the weather coming on thick, were obliged to steer to the northward along the edge of the pack. At noon, lat. by obs. 65° 10′, long. 117° 4′. P.M., Fresh breezes from the S.S.E. and clear; numerous icebergs in sight.

"*March 4th.*—Moderate and cloudy weather. At 5h. hauled to the westward; several icebergs in sight, and a great many birds and whales. At noon wind increasing, with a heavy sea from the N.W.; lat. obs. 63° 56′, long. by chron. at 4 P.M. 115° 30′. At sunset found the variations by ampl., with the ship's head N.E., to be 44° 11′ W. At 9h., being surrounded by icebergs with thick weather and heavy snow-squalls, hove the ship to for the night."

The two following days continued standing to the N.W., with variable winds. At sunrise on the morning of the 6th, in lat. 62° 40′, long. 164°, the variation by amplitude, with the ship's head to the N.N.W., was found to be 42° 21′ W. During the next four days, stormy weather with snow and sleet from the N.E.; stood to the N.W. whenever the numerous icebergs would allow the vessels to run. At midnight on the 10th, in lat. 61° 20′, the Aurora Australis shone with great splendour. The following day was very fine, with the wind from the N.N.E.: innumerable icebergs in sight. In the afternoon, in lat. 61° 27′, long. 105° 30′, the variation by azimuth was found to be 34° 30′ W.

During the next few days the vessels slowly made their way to the W.N.W., constantly surrounded by icebergs; saw whales, penguins, several sea-birds, and *one* albatross, the first seen since leaving Campbell Island; this occurred in lat. 61° 30′. May this be the southern limit of the range of this bird, probably the wandering albatross, which was seen by Mr. F. D. Bennett as far N. as lat. 38° S. off the coast of Brazil?*

March 13th.—Light variable winds from the eastward; surrounded by icebergs: in lat. 61°, long. 103° 40′, passed within a

* Journal, vol. viii., p. 211.—Ed.

¼ of a mile of an iceberg about 300 feet high, with a block of rock attached to it, as represented in the following woodcut from a drawing made on the spot by Mr. John M'Nab, 2nd mate of the schooner.



He describes the rock as a block of about 12 feet in height, and about one-third up the berg: it is unnecessary here to make any observation upon this very remarkable fact, as Mr. Charles Darwin has appended a note to these extracts, pointing out the value of such an evidence of the transporting power of ice:* we will, therefore, only add that this iceberg was distant 1400 miles from the nearest *certainly-known* land, namely, Enderby's Land, which bore W.S.W. of it. But it is highly probable, from the compact nature of the ice, &c., that land extends between the parallels of 66° and 68° S., in which case the iceberg would not be distant above 300 miles from this supposed land. The appearance of land seen by Captain Balleny on the 3rd of March, as above mentioned, bore from the iceberg E.S.E., distant 450 miles.

On the following day the two vessels crossed the track of our great circumnavigator Cook in 1773, and, continuing to the northwestward, they on the 18th, in lat. 58°, long. 95° 15′, crossed the route of Bellingshausen in 1820. On the 21st, in lat. 55°, the autumnal equinox of these latitudes was rendered brilliant by a magnificent display of the Aurora Australis—numerous icebergs in sight, with penguins and various sea-birds. They now crossed Biscoe's track in April, 1831, being the third of the parallel routes, all running to the E.N.E., which occur here within about 5° of latitude; and on the following day encountered a strong gale of wind from the W., with a heavy sea running. In the afternoon of the 24th the gale had much increased; at midnight the cutter *Sabrina* burnt a blue light, distant 1 mile to the S.S.E.: this was answered immediately with another by the schooner, but the sea was running so high that she could not close the cutter.

* See Mr. Murchison's *Silurian System*, p. 541, who notices the great range of icebergs as seen by Captain Vernon Harcourt, R N., in lat. 50° S. Also Mr. Bennett's Voyage in the *Geographical Journal*, vol. vii. p. 212.

March 25th.—Strong gales and squally weather—the vessel labouring and pitching violently. At daylight, says Captain Balleny's journal, "No signs of the poor cutter being in sight—I trust she may be safe." At 9h. a heavy sea broke on board the schooner, staving both boats, and sweeping everything from the decks, and laying the vessel on her beam-ends: for ten minutes she appeared to be settling in the water, but she gradually righted, and on sounding the well did not appear to be making much water. At noon, blowing a heavy gale from the W., with dark cloudy weather. Lat. by account 52° 15′, long. 94° 15′ E.

On the following day the gale moderated, and the schooner was enabled to stand to the northward, with the wind from the N.W. In lat. 49° they passed a quantity of sea-weed, and were surrounded by numerous penguins, divers, and other sea-birds. On the 1st April the *Eliza Scott* crossed the parallel of 45°, standing towards the Mozambique channel; and on the 17th September again reached the port of London, just in time to supply another Antarctic expedition, on the eve of its departure from England, with the information they had been enabled to obtain of a newly-discovered group of islands in the South Frozen Ocean.

On looking at the excellent south circumpolar chart, just published at the Hydrographic Office, it will be seen that this voyage exactly fills up the gap of about 80 degrees of longitude within the parallel of 60°, which, on a former occasion, we pointed out as hitherto not sailed over by any navigator.* About 5 degrees of this navigation was within the polar circle. It were needless to recapitulate here the several voyages which, combined, have effected the circumnavigation of the globe within the parallel of 60°, as a glance at the above-mentioned chart, showing even the track of this voyage, will illustrate it far better than any description; and to that, then, we may refer all those who take an interest in the subject.

It would be impossible to close the simple but apparently faithful narrative of this voyage without adverting to the progress made in discovery in the Southern Seas through the spirited exertions of Mr. Charles Enderby, and other British merchants, so honourable to the commercial enterprise of our country. Graham Land, Enderby Land, Kemp Land, and now the Balleny Isles, are all discoveries made by the ships belonging to this disinterested and praiseworthy owner. The results of this voyage must tend to keep alive the supposition of the existence of either a great southern land or a vast mass of islands, whose northern

* Letter to the President of the R. G. S. on Antarctic Discovery, 1836, p. 12.

limits would seem to range between the 67th and 69th parallels, a part of which we trust, ere long, to see laid down in our charts, and not improbably rendered subservient to the interests of science, if not to the prosperity of our fisheries. Still less can we refrain from adverting to the expedition of the *Erebus* and *Terror*, commanded by Captain James Ross, which has recently left our shores, liberally fitted out by her majesty's government in the most complete manner, for scientific purposes, of any ships that ever sailed from Europe; and it is gratifying to know that the voyage of the *Eliza Scott* cannot but prove useful towards the success of the greater expedition, inasmuch as the Balleny Isles are situated exactly on the eastern verge of the circle traced by Captain James Ross, on his chart, as the limit within which he hoped to find the southern magnetic pole; and thus their discovery will almost insure him a spot for planting his instruments at one of the places most desirable for making observations on magnetic dip, variation, and intensity.

And, although this latter expedition is mainly fitted out with the object of deciding the great problem of terrestrial magnetism in the southern hemisphere, and that its attention will be chiefly directed to this branch of physical geography, we cannot but hope that it may also do much in the cause of Antarctic discovery, and conclude with the earnest wish that the well-known zeal and ability of the gallant commander may be crowned with success, and that he may safely return to his country and his friends to receive the well-merited reward of his toils, in the applause and esteem of all civilized nations.

VII.—*Note on a Rock seen on an Iceberg in* 61° *South Latitude.* By Charles Darwin, Esq.

Having been informed by Mr. Enderby, that a block of rock, embedded in ice, had been seen during the voyage of the schooner *Eliza Scott* in the Antarctic Seas, I procured through his means an interview with Mr. Macnab, one of the mates of the vessel, and I learnt from him the following facts:—On the 13th March, when in lat. 61° S., and long. 103° 40′ E., a black spot was seen on a distant iceberg, which, when the vessel had run within a quarter of a mile of it, was clearly perceived to be an irregularly-shaped but angular fragment of dark-coloured rock. It was embedded in a perpendicular face of ice, at least 20 feet above the level of the sea. That part which was visible, Mr. Macnab estimated at about 12 feet in height, and from 5 to 6 in width; the remainder (and from the dark colour of the surrounding ice, probably the greater part) of the stone was concealed. He made a rough sketch of it at the time, as represented at p. 524. The iceberg which carried this fragment was between 250 and 300 feet high.

Mr. Macnab informs me, that on one other occasion (about a

week afterwards) he saw on the summit of a low, flat iceberg, a black mass, which he thinks, but will not positively assert, was a fragment of rock. He has repeatedly seen, at considerable heights on the bergs, both reddish-brown and blackish-brown ice.* Mr. Macnab attributes this discolouration to the continued washing of the sea; and it seems probable that decayed ice, owing to its porous texture, would filter every impurity from the waves which broke over it.

Every fact on the transportation of fragments of rock by ice is of importance, as throwing light on the problem of 'erratic boulders,' which has so long perplexed geologists; and the case first described possesses in some respects peculiar interest. The part of the ocean, where the iceberg was seen, is 450 miles distant from *Sabrina* land (if such land exists), and 1400 miles from any certainly known land. The tract of sea, however, due S., has not been explored; but assuming that land, if it existed there, would have been seen at some leagues distance from a vessel, and considering the southerly course which the schooner *Eliza Scott* pursued immediately prior to meeting with the iceberg, and that of Cook in the year 1773, it is exceedingly improbable that any land will hereafter be discovered within 100 miles of this spot. The fragment of rock must, therefore, have travelled at least thus far from its parent source; and, from being deeply embedded, it probably sailed many miles farther on before it was dropped from the iceberg in the depths of the sea, or was stranded on some distant shore. In my Journal, during the voyage of H.M.S. *Beagle*, I have stated (p. 282), on the authority of Captain Biscoe, that, during his several cruises in the Antarctic Seas, he never once saw a piece of rock in the ice. An iceberg, however, with a considerable block lying on it, was met with to the E. of South Shetland, by Mr. Sorrell (the former boatswain of the *Beagle*), when in a sealing vessel. The case, therefore, here recorded is the second; but it is in many respects much the most remarkable one. Almost every voyager in the Southern Ocean has described the extraordinary number of icebergs, their vast dimensions, and the low latitudes to which they are drifted: Horsburgh* has reported the case of several, which were seen by a ship in her passage from India, in lat. 35° 55′ S. If then but one iceberg in a thousand, or in ten thousand, transports its fragment, the bottom of the Antarctic Sea, and the shores of its islands,† must already be scattered with masses of foreign rock,—the counterpart of the "erratic boulders" of the northern hemisphere.

* Philosophical Transactions, 1830, p. 117.

† M. Cordier, in his instructions (L'Institut, 1837, p. 283) for the voyage of the *Astrolabe* and *Zélée*, says, that the shores of South Shetland were found, by the naturalist of an American expedition in 1830, covered with great erratic boulders of granite, which were supposed to have been brought there by ice. It is highly desirable that this fact should be inquired into, if any opportunity should hereafter occur.

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